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VOLUME XII MAY 21, 1923 NUMBER 11

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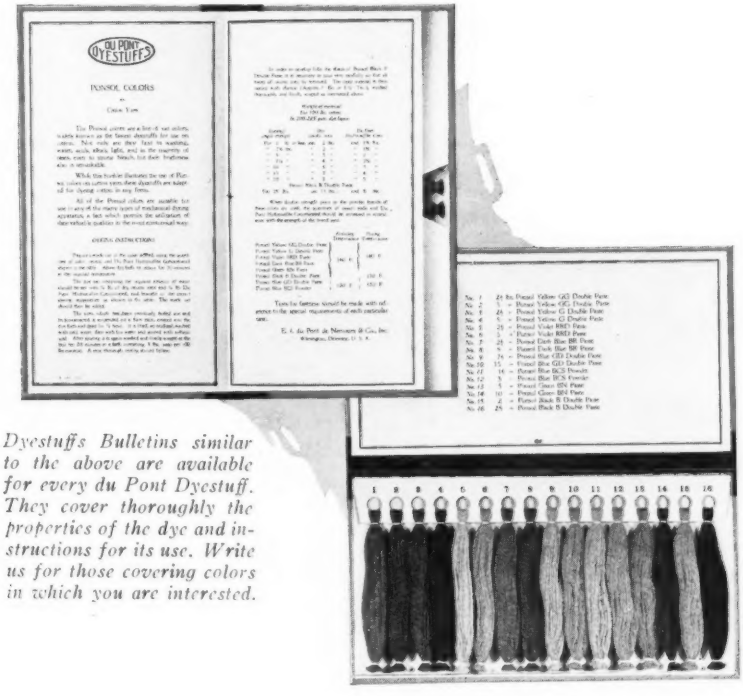

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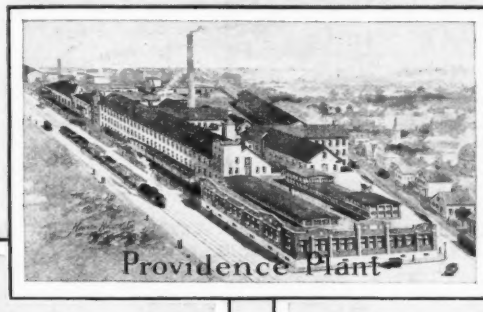
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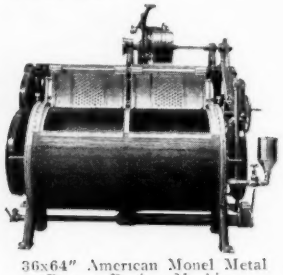

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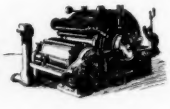

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Contents of This Issue

May 21, 1923

New Process of Discharging Color in Printing Indigo Dyed Fabrics 379
R. Haller

Bleaching Silk 382
George Emmons

Cellulose Silk 385
W. O. Mitscherling

The Ionamines: Dyestuffs for Acetate Silk (concluded) 387
Arthur G. Green, F.R.S., and Kenneth H. Saunders, B.Sc.

Proceedings of the American Association of Textile Chemists and Colorists:
Northern New England Section: April Meeting 389
Carbonizing with Chloride of Alumina. *A Paper* by R. O. Fernandez 389
Carbonizing Dress Goods with Aluminum Chloride. *A Paper* by Frank Biery 392
Carbonizing Worsted Piece Goods. *A Paper* by Miles R. Moffatt 392
Discussion of Papers 393
Business Meeting 394
Constitution and By-laws 394
Concerning the Year Book 396
New York Section: Notice of May Meeting 396

Italian Government, Pending Outcome of Investigation, Will Keep Hands Off Dye Tariff 397

Printing Yarn for Chintz Effects 399

Editorials:
The Government Scores 410
"From the Lowell Courier Citizen" 410

Leo R. Webber 412

Recent Patents 412

Inquiry Department 413

Foreign Trade Opportunities 414

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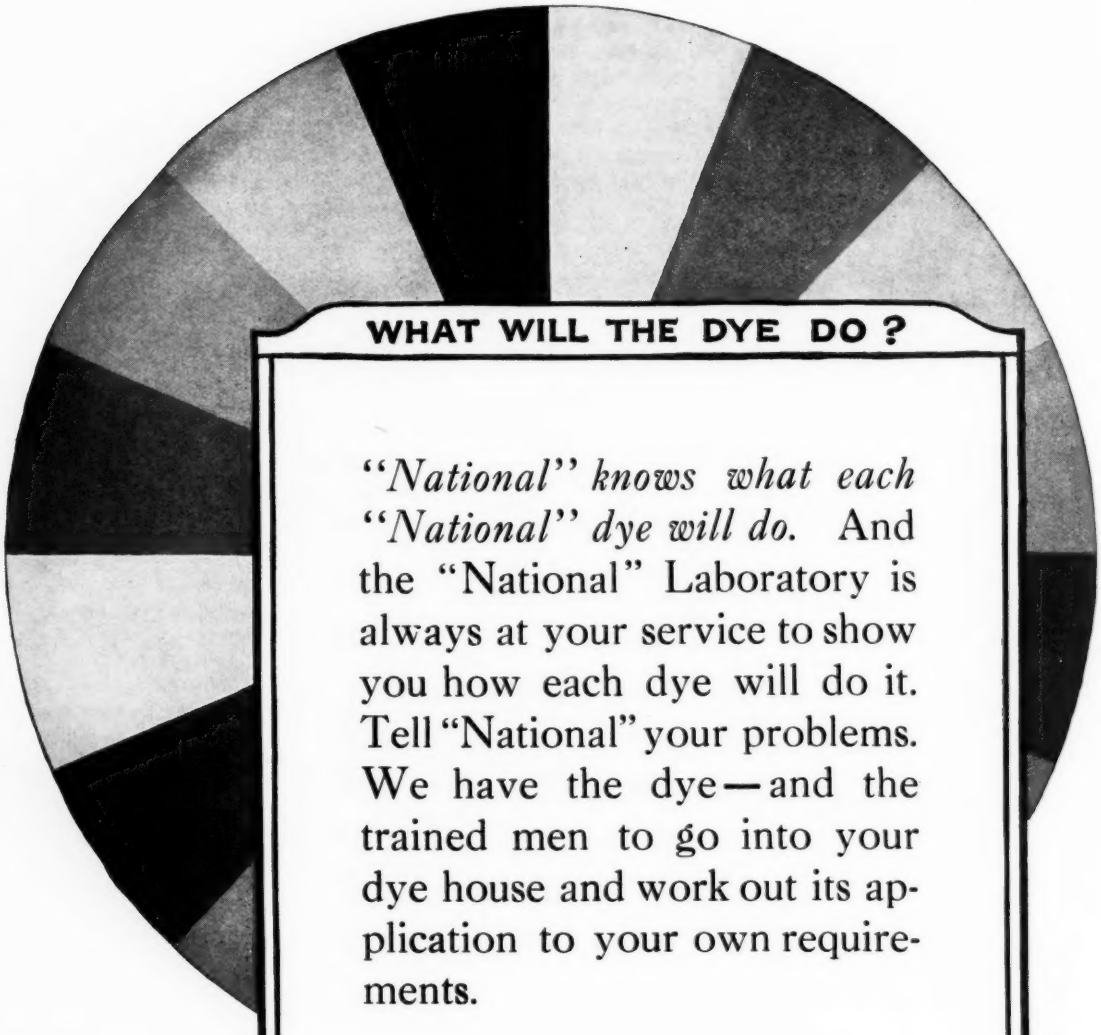

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VOLUME XII NEW YORK, MAY 21, 1923 NUMBER 11

New Process of Discharging Color in Printing Indigo Dyed Fabrics*

Early Efforts—Prior Printing with Ink Pastes and Lead Colors—Discharge Dyeing—The Indanthrenes —Unexpected Difficulties—A New Process—The Badische Process—Comparative Tests

By R. HALLER

(*Translated for* AMERICAN DYESTUFF REPORTER *by Ismar Ginsberg, B.Sc., Chem.*)

EVER since Indigo was used as a dyestuff, in fact even in the earliest days of its application to the dyeing of textile fabrics, efforts have been made to produce bright colors on materials dyed with it. The processes that were first used for this purpose were based on the principle of printing the white fabric before dyeing with ink pastes containing lead and copper salts. Then the fabrics, which had been treated in this manner, were dyed in the usual way in the vat. This resulted particularly in the fixation of lead on the printed spots, an effect which was assisted by the influence of the alkaline dye bath on the lead salts, contained in the printing ink. At the same time this action was enhanced by the presence of the copper salts in the printing ink paste, so that the printed spots were made effectively resistant to the dyeing action of the Indigo bath. After the dyeing process had been completed and the cloth had been subjected to the subsequent aftertreatment, the printed spots or design, which first appeared as white markings on a blue background, were converted into yellow or in particular cases into orange colors by passing the cloth through hot baths of bichromates or basic chromates.

Another variation of this process consisted in printing the design in lead-containing colors on a light blue background on the one hand, and on the other hand in using color pastes which were free from lead salts, but which contained copper salts preferably as the active agent. After the printed cloth had been dyed in the regular manner and then subjected to the proper aftertreatment with bichromate solution, there were produced [in addition to greenish effects, which were formed as a result of the superposition of yellow on blue] light blue figures on a dark blue background.

This method of obtaining light colors on Indigo-dyed cloth was called resist dyeing or resist printing, and the printing colors that were used for this purpose were called resist or reserve colors, or just protective colors, due to the fact that these colors possessed the function of protecting the places whereon they had been imprinted from the action of the indigo dye bath. For a long time the trade was content with this sort of illuminated blue fabrics, which varied very little in appearance. Even to-day dark blue fabrics, dyed with Indigo, and bearing designs in orange and yellow, are still much sought after, especially in the Slavic countries.

DISCHARGE DYEING

But after it had been learned that it was possible to obtain variegated colored effects on dark blue fabrics by the so-called discharge method of dyeing or printing, then the possibility of varying the effects produced was recognized and fabrics were dyed and printed in all sorts of shades and colors. The process of discharging color in dyeing and printing textile fabrics, as it is known to-day, is based on the principle that bichromates in particular, and chromates as well, when printed on Indigo-dyed fabrics under certain definite conditions, possessed the property of destroying the Indigo dye at the printed places when the cloth was immersed in hot acid baths. The Indigo was thus converted into the water-soluble compound, isatin. By the use of chromate-containing printing pastes it is possible to produce, for example, white effects on light blue, Indigo-dyed fabrics in addition to the effects produced by resist printing with lead-containing and copper-containing printing pastes.

But in carrying out this process care must be taken that the chromate-containing discharge colors at the same

*Textileberichte, 1923; 121.

time prevent the dyeing of the fabric with Indigo in the dye bath, which is also effected by the addition of the copper salts. This method of discharge-dyeing on dark, Indigo-dyed cloth is therefore divided into two parts. In the first place the colors must be printed on the light blue background and then the discharge colors must throw off the Indigo on subsequent dyeing to a dark blue; and finally, when the cloth is passed through a hot acid the light blue background must be discharged by the aid of the chromates. Hence this process is a combination of resist and discharge dyeing, and it may be called a discharge-resist process.

At this point I must emphasize particularly the fact that it has been customary to designate not only printing colors as discharge colors, but also all those dyestuffs, which possessed the property of changing the Indigo-dyed fabrics on which they were printed, in some chemical way or other. The products, which were evolved from the dyestuff due to the action of the "discharge" material, also possessed the property of being easily removed from the cloth by some simple operation, such as treatment in an alkaline bath, a procedure which was carried out for the most part in such dyeing practice. For this reason, for example, such materials as chromates, chlorates and sulphoxylates have been designated as discharging agents.

The Indanthrenes

The author cannot go into the details of the processes that were devised to overcome the difficulties that ensue in the white discharge dyeing of Indigo-dyed fabrics, processes that were based on the use of the very powerful reducing agents, the sulphoxylates. These processes were not a success due to the fact that there were only a few colors that could withstand the powerful reducing action of these salts. The action of the sulphoxylates was rendered still more powerful, as it was possible to convert the Indigo white into a compound, which was fast to air, by the use of Leukotrop W. To be sure, even that series of most resistant dyestuffs, the indanthrene dyes, could for the most part be decomposed—that is, discharged—and converted into colors which, while not perfectly white, were at any rate whites. This action was accomplished by the use of the alkaline Rongalite-Leukotrop W discharge process.

But as these indanthrene dyestuffs, which are particularly striking because of their very vivid shades on the one hand, and on the other hand because of their unparalleled fastness, appeared to be especially well suited for producing variegated colored designs on fabrics, dyed with the equally fast Indigo, it was natural that color technologists looked to these indanthrene colors to solve their problem of producing brightly colored designs on fabrics that had been dyed with Indigo.

Unexpected Difficulties

But in their attempts to solve the problem in this manner they encountered various unexpected difficulties. It appeared that the only possible way of using the different indanthrene colors for illuminating Indigo-dyed fabrics was by printing the design with printing pastes containing alkali and sulphoxylates, as it did not seem possible to reduce the indanthrene dyestuffs preparatory to dyeing except in an alkaline medium, and in certain cases in the presence of the substance known as rongalite. This was the only way in which the colors could be fixed on the textile fibers. It was not possible to use Leukotrop W because of its destructive action on the indanthrene dyestuffs in combination with the discharge material in an alkaline medium.

In the case of certain of these dyestuffs, for example, the blue, it was possible to obtain excellent discharge colors by this process, when it was carried out under certain definite conditions. But even in this case the technical difficulties involved in securing a uniform precipitation of the dyestuff on the textile fibers were very great. We will have more to say about this later in the article. It was impossible to obtain a yellow by this process. All the experiments that were made with this end in view always yielded discharge colors which were more or less greenish in tone due to the reoxidation of the Indigo.

It was consequently apparently impossible to obtain discharge colored designs on Indigo-dyed fabrics by the alkali discharge process. For it was never possible to prevent the reoxidation of the reduced Indigo completely. The Indigo that is referred to is the color that is impregnated into the fiber at points where the discharge-colored design was printed. It was natural that these small amounts of reoxidized Indigo in discharge printing with blue dyestuffs should not have any great effect on the brightness of the printed design. Similarly when the design was printed in green, there was no dulling of the shade. But this process could not be used to produce a large enough variety of colors in the printed designs to make the same universal in its application.

A New Process

After making a long series of experiments, and after experiencing failure for quite a long time, the author has succeeded in developing a process which has effectively overcome all the difficulties of the former processes used for the production of brightly colored designs on Indigo-dyed fabrics. The new process consists of a combination of the Jeanmair printing process with indanthrene dyestuffs and the leukotrop discharge process on Indigo. Very favorable results were obtained even by mixing the individual printing colors. The new process represents a great advance in dyeing technology relating to this class of dyestuffs in that it makes it possible to use, for the first time, neutral printing colors. Another great ad-

vantage of the new process is that it makes possible a sharp separation of two operations, the discharge of the Indigo and the fixation of the indanthrene dyestuff. These operations are carried out in such a manner that on the one hand the imprinted mixture of leukotrop discharge colors and the Jeanmair indanthrene printing colors on the other hand are subjected to a steaming process, as the first step. The reduction of the Indigo takes place in a normal manner during the steaming; the benzylation of the Indigo white is also accomplished by this treatment. After the fabrics have been processed in this manner, they are passed through a bath of 20 deg. Be. caustic soda, which is maintained at a temperature of 70 deg. Cent. It is only necessary for the cloth to remain in this bath for a matter of fifteen seconds to fix the admixed indanthrene dyestuffs through the aid of the metallic salts, ferrous sulphate and stannic chloride, which are contained in the dye mixture. At the same time the benzylated Indigo white is removed. The treatment of the Indigo-dyed fabrics in the hot liquor produces no bad effects on the dye. In fact, it has a beneficial effect in that the fastness of the dyed cloth to washing and rubbing is increased to a not inconsiderable degree.

In this manner it is possible to use practically all of the vat dyestuffs, which do not belong to the Indigo series, as discharge colors for printing designs on fabrics dyed with Indigo. Even the dyestuffs, Indanthrene Yellow G and R, which are discharged by means of the leukotrop discharge to give a flat white color, yield entirely satisfactory results by the new method. Very striking results are obtained on the other hand when certain hydron dyestuffs are used, such as Hydron Yellow NF.

The Badische Process

Not so very long ago the Badische Anilin & Soda Fabrik brought out a new process of discharging color on Indigo-dyed fabrics, in which the indanthrene dyestuffs were used. This process was a development of the old alkaline discharge color process. The discharge color pastes contain in addition to the ordinary discharge chemicals, Rongalite CL, which is a mixture of Rongalite C with Leukotrop W. glycerine, potash (in the proportion of about 20 per cent of the entire weight of the paste) and anthraquinon. Of course, the printing paste contained the usual indanthrene color.

This printing process, which, as is self-evident, makes it unnecessary to pass the cloth through a strong alkaline bath, as the printed goods after being steamed are only immersed in a weak alkaline bath for the purpose of removing the products that were formed through the decomposition of the Indigo, suffers from the same disadvantages which have been described above in connection with the old methods of discharging colors on Indigo-dyed fabrics. It is possible to obtain blue or green colored goods, but it is not possible to obtain a clean, pure yellow, as this color is always given a greenish cast by the reoxidized Indigo.

Moreover, this reoxidation of the Indigo has the additional disadvantage that the Indigo dyes those places on which the discharge design had been printed in the regular Indigo vat dyeing manner, so that as soon as the cloth is passed into the alkaline bath, the aforementioned places are colored again with the Indigo dye and given the same shade as the rest of the cloth. This is a fact which has not been given the proper attention and, in fact, has often been passed by without any consideration at all. It has also been mentioned that the Badische Anilin & Soda Fabrik process includes anthraquinon besides potash in its discharge printing paste composition. Planowsky (see Ztschrft. fuer Farbenindustrie, 6. 109 (1907)) has shown the role that the anthraquinon plays in the leukotrop discharge process on Indigo-dyed fabrics. Sulphoxylates reduce anthraquinon to oxanthrol, which must certainly play the part of a hydrogen carrier in that sense that this salt yields up hydrogen so as to reoxidize to anthraquinon again. But oxanthrol reacts in the following manner in the presence of alkalies and the oxygen of the air, that is under conditions which exist as the discharge printed cloth is passed into the alkaline bath:

This behavior of oxanthrol has been explained by Manchot (Inaugral Dissertation. Goettinggen 1900).

The fact that oxanthrol acts in this manner immediately made it clear to us that the bluing of the discharge printed designs, which were prepared by means of sulphoxylates in an alkaline medium in the presence of anthraquinon, was to be laid to no other fact except the formation of hydrogen peroxide at the places where the design was printed on the Indigo-dyed fabrics. It is easily understood that the presence of even minute amounts of this substance is able to cause the reoxidation of comparatively large amounts of Indigo white.

Comparative Tests

Various comparative tests were made by different methods of discharge printing of designs in Indigo-dyed cloth. The dye used was Anthraflavon GC. In the first two tests the dyestuff was mixed with discharge ingredients according to the Badische process. The printing paste contained 310 and 293 parts of British gum thickening respectively, 50 parts of glycerine in each case, 200 parts of potash likewise and the same amount of Rongalite CL, 217 parts of the dye paste in each case and in the first test 23 parts of water and no anthraquinon and in the second test 40 parts of anthraquinon, the total being 1,000 parts of printing paste in each case. The third test was made with a mixture which was worked out by the author in connection with his new process of discharge printing in Indigo-dyed fabrics. This mixture contained 276 grams of anthraflavon, 24 grams of glycerine, 255 grams of a 2:1 solution of British gum, 55 grams of Rongalite C, 55 grams of zinc oxide, 50 grams of water—

the last four constituents being made up into a solution by themselves first and then added to the mixture—180 grams of Rongalite CL, 62 grams of iron sulphate, 21 grams of tin salt (stannous chloride with two molecules of water of hydration) and 22 grams of water. The entire mixture will then weigh 1,000 grams.

The samples of cloth that were printed with the first two mixtures were steamed and then passed through a bath of dilute alkali, in accordance with the directions of the Badische Anilin & Soda Fabrik process. The samples of cloth printed with the third printing mixture were passed through a bath of concentrated caustic soda of 20 deg. Be. concentration at a temperature of 60 to 70 deg. Cent. The cloth was then acidified, washed and dried.

(In the original article three samples of the printed Indigo-dyed cloth are given. The difference between the three printings is very apparent. The design consists of an inner filled circle printed in yellow, and an outer concentric ring, colored light blue. The colors obtained by the new printing process are far clearer than those secured by the first two methods and, furthermore, the yellow is a clear yellow and not tinted with green as in the first two samples. Trans.)

The printed samples indicated that in the new process there was no formation of reoxidized Indigo white due to the use of Leukotrop W in the presence of zinc oxide. However, it may be mentioned that the process which produced an orange colored reaction product through condensation has not yet been investigated so thoroughly that it can be asserted that a series of reactions does not take place. It is safe to suppose that Indigo white is formed in the first place, and that a secondary reaction then takes place resulting in the conversion of the Indigo white compound into the zinc benzyl compound. In this consideration the presence of alkali must not be looked upon as unimportant, because there does not appear to be any reasonable doubt that it has a marked effect on the process. Furthermore, it must not be overlooked that the formation of the benzyl-zinc-indigo-white compound serves only to explain the reaction that takes place when a neutral printing paste is used, if the zinc oxide is not considered as a weak basic salt. It must not remain unmentioned that the addition of ferrous sulphate and stannous chloride in the printing paste, made in accordance with the new process developed by the author, undoubtedly gives a more acid character to the same.

Bleaching Silk

Two Principal Processes—Sulphurous Acid Gas—Hydrogen Peroxide—Sodium Peroxide—Effects of Alkalies

By GEORGE EMMONS

AS with other fibers, there are several methods of bleaching silk. In general, the natural fiber when properly relieved of its gummy matter is very white. Consequently, the slight tint may generally be disregarded in dyeing, as almost any dye applicable to silk is apt to obliterate it. However, if a pure snow-white effect is desired, even silk that has had practically all of its gummy matter removed will usually require bleaching.

Soupled silk and ecru silk contain, of course, more or less gummy substance, and so are rather apt to have a tint of some kind. It will often be the case that it is desired to bleach these forms of silk fiber.

Under the circumstances that it is proposed to bleach silk, we have the option of at least two principal processes:

1. By the action of sulphurous acid gas.
2. By the action of hydrogen peroxide.

The reader is not to understand that I am omitting sodium peroxide as a bleaching agent. Not at all. The sodium peroxide bleaching bath simply provides another way of getting the action of hydrogen peroxide.

The method which depends upon the action of sulphurous acid is also used for wool, and used to a large extent. Successful with one animal fiber, it is no surprising fact that it should be successful with another, such as silk.

Sulphurous Acid Gas

The bleaching action is produced by the destruction of the coloring matter. This may be accomplished by an oxidation of the substance or substances to which the coloring effect is due. This is also the basic action in the bleaching of silk by means of hydrogen peroxide. Oxidation consists in adding oxygen. In chemistry, the subtraction of oxygen (or the addition of hydrogen) is termed a reducing action. In general, the effect is to wipe out the color effect. Unfortunately, however, from the point of view of bleaching, this reduction is reversible and exposure to the oxygen of the atmosphere brings back the color.

It seems that wool bleached by the sulphurous acid gas method is subject to a gradual return of the yellow tint of the original fiber. And I am afraid that I cannot promise that there will be much greater success with silk. The bleaching effect is not permanent, and the retention of

even traces of the sulphurous acid by the fiber causes difficulties in dyeing subsequently. Nevertheless, it may be a swell to have a short account of the process. The silk may be treated in the loose condition, in the form of yarn, or in the woven or knitted fabric.

The work is simply moistened and then exposed to the fumes of sulphurous acid. The exposure may last all night or longer. Provision is made of a suitable compartment or room, in which the fumes are produced or into which they are brought (as by piping). It should be very tight everywhere except the place of proper exit.

The gas may be produced simply by burning sulphur in a suitable container, as an iron pot or an earthenware vessel. As to the comparative suitability of burning the sulphur inside or outside the exposure chamber, it may be said that the outside method is to be preferred. The gas is then conducted by tightly jointed piping to the room or box. The gas may advantageously be made to enter at one end of the chamber and pass out at the other. From the fact that the iron pot, earthenware vessel or other means for holding the burning sulphurs is a kind of stove, the process is sometimes called "stoving."

The silk is to be damp when entered into the chamber, but not wet. Dry silk can probably be bleached at a very slow rate. It is desirable and more or less necessary that the work be so disposed that the fumes can get ready access to all parts. Naturally, every part of the work should be equally exposed in order to promote evenness of action.

There will often be more or less moisture associated with the sulphurous acid gas. Such moisture may be in the air used to maintain combustion. The conjunction of the fumes and such moisture may be expected, if condensation is permitted, to result in the formation of sulphuric acid. Consequently, it is of importance that the chamber be so constructed, particularly the ceiling, that condensation be prevented or else that the condensed drops be led off and not allowed to drip upon the silk.

Silk is, like wool, resistant to the action of acids, and both fibers are frequently dyed in dye baths of an acid character. At the same time, silk is apparently less resistant than wool to mineral acids when in a concentrated state.

Concentrated acid forms on silk, or any fiber for that matter, when a dilute acid suffers evaporation by drying or the like. The constant removal of the water by evaporation results in an increasing condensation. Consequently, in arranging for the bleaching of silk by the sulphurous acid method care is to be taken that no condensation is permitted to fall upon the work during bleaching. Silk, however, is not as resistant as wool to the effect of mineral acid solutions drying into the fiber, as the luster is liable to be affected; therefore, all such acids should be thoroughly washed out of the silk before drying. When bleaching, the silk may be dry a good while before it comes out; so that the precaution of washing out acid would probably be a belated treatment.

Hydrogen Peroxide

Hydrogen peroxide is water (H_2O) to which another atom of oxygen has been added, the chemists representing the result as H_2O_2. This additional atom of oxygen is, however, rather loosely held, and herein lies the usefulness of this popular substance. The loosely held oxygen atom is ready for the business of oxidizing. It is so loosely held that it readily leaves the hydrogen peroxide and combines with all sorts or substances that may lie in the way.

This is, I think, an essentially correct account of the action of hydrogen peroxide in bleaching and in the destruction of the milder germs when used as an antiseptic. Hydrogen peroxide is ordinarily employed in the form of a very dilute aqueous solution. This may be simply water containing as little as 3 per cent of H_2O_2. However, stronger aqueous solutions are now obtainable—up to 10 per cent.

The silk fiber may be bleached in the following way. The silk is steeped in a bleaching bath. Here is a recipe for a suitable liquor.

2 to 3 gallons hydrogen peroxide (12 vols.)
¾ to 1¼ pints sodium silicate
1 pound white soap
Water as directed
10 gallons water

The sodium silicate mentioned here is also known as soluble glass or water glass. The white soap is to be dissolved previously in a moderate amount of water. When all the ingredients are ready, the hydrogen peroxide, the sodium silicate and the solution of white soap are all mingled with the 10 gallons of water.

The whole is warmed until the temperature of 120 deg. Fahr. (49 deg. Cent.) is reached. The bath is maintained at this temperature level during all subsequent use in bleaching. The silk is entered and steeped for anywhere from eight to twelve hours. It may be convenient to have the steeping in process from about the close of the day to the resumption of work next morning.

At the end of the bleaching operation the silk is given an acid treatment. That is to say, it is treated in a bath containing, in addition to plain water, a small amount of sulphuric acid. Next, the work is thoroughly rinsed in plain water. Hydrogen peroxide, as is well known, loses its strength when exposed to the air for a sufficient period. This simply means that the loosely held atom of oxygen passes off into the atmosphere and that the residual liquor is water.

There are several ways of preventing the premature decomposition of hydrogen peroxide. We may simply add a small relative amount of acetanilide to the com-

mercial solution of hydrogen peroxide. Another substance useful for the purpose of preserving the strength is phosphoric acid. However, I have good authority for saying that it is not to be regarded as equal to acetanilide. Other substances said to be effective, too, are uric acid and barbituric acid.

Sodium Peroxide

The bleaching procedure which makes use of sodium peroxide is not really essentially distinct from the hydrogen peroxide process, as this latter bleaching agent is really formed in the bleaching bath and is the oxidizing substance that produces the effect wanted.

The chemists give the formula Na_2O_2 for sodium peroxide. This substance may be purchased in a rather high degree of purity in the form of a yellow-white powder.

Sodium peroxide is not a chemical especially suited to the careless. Some care must be taken in the handling and using of sodium peroxide, as it is easily decomposed in the presence of moisture and organic matter with the evolution of large volumes of oxygen which may lead to explosions or fires. When handled with intelligent precaution, however, it is by no means a dangerous chemical.

In storing it, store in small packages. It is readily obtained in 10-pound amounts packed in tins. The storage space should be cool and dry. No contact should be permitted with water, paper, excelsior or any form of organic matter.

When sodium peroxide is brought into contact with water, a violent reaction occurs. Consequently, large amounts or lumps are not to be added all at once to water. If this suggestion is neglected an explosion or fire may result. The chemical may be added to water without troublesome results by simply following the precaution of sifting it onto the body of water gradually and by keeping the water well stirred all the time the addition is being made. Follow the precautions as to storage and as to making additions of it to water, and no trouble should result. No careless person should be permitted to have anything to do with storing or using.

The way hydrogen peroxide really gets into the game will perhaps be better understood with the aid of a couple of very simple chemical equations.

The addition of sodium peroxide to water may be done peacefully enough with the formulae for the two substances. Thus:

$$Na_2O_2 + H_2O = 2NaOH + H_2O_2.$$

This equation, even for those who know scarcely any chemistry, is readily understood. The first substance, Na_2O_2, is the sodium peroxide and the next, H_2O, is just water. The result is NaOH, caustic soda, and H_2O_2. The latter is our old friend hydrogen peroxide.

Similarly, when sodium peroxide and sulphuric acid, H_2SO_4, are brought together, we get hydrogen peroxide again. This is indicated in the following equation:

$$Na_2O_2 + H_2SO_4 = Na_2SO_4 + H_2O_2$$

Here we have a molecule of sodium peroxide and a molecule of sulphuric acid added together. This combination produces Na_2SO_4 (anhydrous Glauber salt) and also hydrogen peroxide.

So, then, whether sodium peroxide be combined with water or with sulphuric acid, we get H_2O_2, which is hydrogen peroxide. However, in the former case we get, besides, two molecules of caustic potash. This substance is not wanted in a bath in which silk is to be introduced. Let me explain.

Effects of Alkalies

Silk fiber is badly affected by alkalies, and in this respect resembles wool. As compared with wool, however, silk fiber does not dissolve as readily in solutions of caustic soda; the luster and strength, however, are badly impaired. Consequently, the result of adding sodium peroxide to a bath of plain water would result badly for silk, because not only would hydrogen peroxide be produced but caustic soda as well. On the other hand, when sodium peroxide is combined with sulphuric acid—as the second equation shows—we get, in addition to the hydrogen peroxide, the substance known as Glauber salt, which is unobjectionable.

What is the answer? It is this. When the bleaching bath is prepared we get ready, first of all, a body of plain water. Then we put in a quantity of sulphuric acid. Finally we add sodium peroxide slowly. If we have sufficient sulphuric acid in the water, the second equation indicates what takes place. This means we have a bleaching bath containing water, Glauber salt and hydrogen peroxide. Such a bath is what we want.

But if the amount of sulphuric acid is insufficient, then only a part of the sodium peroxide put in will be made to combine with sulphuric acid. The excess of sodium peroxide will then combine with plain water. And the result of this is, as the first equation shows, the production not only of hydrogen peroxide but of caustic soda as well.

In short, then, if there is too little sulphuric acid in the bath to take care of all the sodium peroxide, our bleaching liquor will contain more or less caustic soda. This is a result not wanted, as already explained.

The way to govern this matter is to test the bath with a piece of blue litmus paper. It should turn red upon being wetted with some of the liquor. The appearance of the red will show that the bath is acid. This means that the bath contains something more than enough of sulphuric acid to take care of the sodium peroxide.

It is proper to prepare the bath by putting into the plain water the proper amount of sulphuric acid, too little rather

(*Concluded on page* 409.)

Cellulose Silk

Cellulose Used for Silk—Nitrocellulose Process—Cuprammonium Process—Viscose Process—Cellulose Acetate Process—Present Problems in the Industry

By W. O. MITSCHERLING

Mt. Washington, Md.

CELLULOSE silk, or commonly called artificial silk, is not a substitute for natural silk, but is a product which must be placed in a class of its own. Many early attempts were made to prepare substitutes, but all that could be done was to imitate from Mother Nature a crude outline of the process.

Genuine silk consists of a coagulated fluid stream which emerges as a gummy liquid from two small orifices in the head of the silkworm and hardens in contact with air. The genuine filament contains as high as 18 to 20 per cent soluble gum, the sericin, and only 75 to 82 per cent represents the true silk, which is mostly fibroin. Only 300 to 700 yards of silk are reelable from each cocoon. The inner layers of the cocoons are so fine that it would not pay to reel them.

The mechanical part of Nature's process is to force a fluid through orifices into coagulating media. And this very part is adapted in the cellulose-silk industry. The fluids used are nitro-cellulose, cuprammonium cellulose, viscose, and cellulose acetate. The coagulating media are air, water, acids, acid salts, and alkalies.

Cellulose Used for Silk

Before we can enter into a discussion of cellulose silks we must be familiarized with cellulose as a chemical compound. The fact that we are dealing with a highly complex compound prohibits the discussion of it in its molecular state in this address. And we merely have to compare forms of cellulose suitable for this industry with the purest form of cellulose as nature presents it—the purified cotton, or normal cellulose. Chemical wood pulp always contains a small amount of lower carbohydrates, but with selective purification it is possible to isolate normal cellulose from wood pulp which is identical with cotton cellulose as a chemical compound.

Cotton cellulose must be purified before it can be used for cellulose silks; it must be freed from wax, oil and fat, pectoses, and mineral matter. This purification is effected by boiling with a weak caustic soda solution, and a subsequent bleach will remove coloring matter. The silk industry calls for high-grade linters, since there is no advantage in using long or medium staple cotton.

The average analysis of linters is about 89 to 90 per cent cellulose wood pulp; spruce contains as high as 40 to 52 per cent cellulose. Not all raw materials for the entire cellulose industry are produced in the United States. It is often thought that imported wood pulp is superior. However, the analysis reveals that American wood pulp as produced by the largest manufacturers actually turns out a product which is very superior to imported chemical pulp.

The structure of the cellulose molecule is still a matter which requires intensive investigation; however, very fine work has been done along these lines by Professor Hibbert (J. I. E. C., 13 (1921), 256). His theory of an intramolecular glucosidic condensation of the dextrose molecule lends itself to the solution of a number of technical problems.

Both cotton linters and chemical wood pulp in their purified state are used for the production of cellulose silks. The type of process determines the source of raw material. So the nitro-cellulose-silk process calls for linters. The same is true of acetate silk. The cuprammonium process adapts both linters and chemical wood pulp, while in the viscose process wood pulp is preferred. I do not wish to convey the idea that it is impossible to use linters in the viscose process; in fact, intensive experimental work is being done with purified linters for xanthates. But it seems that wood pulp dominates not only from the chemical, but also from the commercial standpoint. It seems further that certain impurities present in wood pulp check premature gelation and silk produced by the viscose process from linters is opalescent and takes up dyes unsatisfactorily. Very similar side reactions occur in the cuprammonium process, with the exception that cuprammonium silk produced from linters takes up dye remarkably well, but the softness of the filaments suffers. There is no doubt that in time our knowledge will bring forth differentiation in cotton and wood cellulose.

Nitrocellulose Process

The oldest method is the nitrocellules process, or commonly called the Chardonnet process. Cellulose is nitrated to a proper degree—that is, it must be completely soluble in the solvent selected, which can be a mixture of ether and alcohol. The superfluous acid is removed by centrifuges and the nitrated product carefully washed. The excess wash water is removed again by hydro-extractors. The ester is dissolved either wet or previously dried, and forced through nozzles which are perforated with very fine holes to form filaments. This manipulation is termed "spinning."

Two spinning methods are in use by this process, wet and dry spinning. Naturally, the type of nitration differs with the type of process. In the dry-spinning process the filaments are set by air, and if the wet-spinning process is used the filaments pass through a setting bath, which may be water. The moisture of nitrated cellulose is gaged accordingly. To set nitrocellulose in air very rapidly, very wet nitrocellulose must be used. In the dry-spinning process the combinations of solvent ether-alcohol and non-solvent water are so selected that the slightest evaporation of the lower boiler, ether, reaches a state in which the nitrated cotton is insoluble and therefore coagulation takes place. The evaporation is accelerated by heating units. The solvents are naturally recovered as much as possible. In the wet process, on the contrary, the solvent is diluted with a non-solvent during the process of spinning, and coagulation of the threads takes place by passing the nitrocellulose solution through a water bath. The water content of the nitrated cotton can be therefore considerably lower.

In both cases the filaments are collected on spools or drums, subjected to further extraction of the solvent, and finally partially dried under tension. The filaments are collected in bunches of 12, 18, 22, 36, and even 72, to form a thread. This thread is highly inflammable and must be subjected to a process which removes the nitro groups, leaving cellulose, or, in other words, is denitrated. This is accomplished by immersing the silk into a solution of alkaline sulphide.

After denitration the silk is again washed and subsequently bleached. It is then reeled and twisted so that each yard of silk has about 100 twist, and is skeined into 2,500 to 3,000 yard skeins, in which state it is marketed.

Cuprammonium Process

The cuprammonium-cellulose process (Despaisses and Tauly process) is based on the property of cellulose to dissolve in copper hydroxide and ammonia. This may be accomplished by several methods. One, older, method is to treat copper turnings with ammonia, preferably in the presence of lactic acid. This cuprammonium solution dissolves pure cellulose rather slowly, but reacts very fast when the cellulose is previously mercerized. A later improvement is to mix the cellulose with copper hydroxide paste and dissolve this mixture in ammonia; or, vice versa, the cellulose is soaked in ammonia and copper hydroxide paste is added. A very stable copper-ammonium-cellulose solution can be obtained by this process.

The devices for thread formation are very similar in all processes. Spinning apparatus of various types are used, but in principle the cellulose solution is forced through nozzles with very fine holes, which are called spinnerets. Spinnerets are made of platinum, non-corrosive alloys, or glass.

The setting bath for the cuprammonium process consists of sulphuric acid alone, or the collected filaments are first set in an alkaline bath and the copper salts removed afterwards with sulphuric acid. The salts formed are soluble in water and washed out with water. The silk is treated by similar methods, as in all silk processes to produce soft filaments resembling the genuine article.

Viscose Process

The most popular process is the viscose process (Stern). Cellulose is first mercerized without removing the caustic soda, and the mercerized produce is treated with carbon disulphide to form the cellulose xanthate, which is dissolved in water. The cellulose solution is matured and put through the spinning operation by pressing it through very fine holes into a setting bath, which is an acid or an acid-salt solution. The sulphur compounds formed are removed by alkaline solutions and the filaments carefully washed, dried, and put through various processes to produce a product which is at least equal to other cellulose silks.

Since viscose solutions undergo a progressive decomposition viscose must be spun at a certain stage of maturity, and the setting bath is selected accordingly. Viscosities of viscose solutions change progressively with the decomposition. First, the viscosity increases, then gelation takes place, and finally the cellulose separates out in form of a translucent cake. It is possible to produce viscose threads with great fineness.

Cellulose Acetate Process

The cellulose acetate process (Donnersmarck) consists in acetylating cellulose with a mixture of glacial acetic acid and acetic anhydride in the presence of a catalyst, which may be sulphuric acid or a zinc salt. The acetate is dissolved either in acetic acid or another solvent, such as ethyl acetate, and discharged through orifices into a non-solvent, such as water, to form a thread.

It is claimed that acetate silks are but little affected by moisture. Acetate silks are just as soft in touch as other cellulose silk. Acetate-silk possesses great resistance to moisture and dyestuffs. It is further distinguished by its low density in comparison with other cellulose silks.

Present Problems in the Industry

All processes require skill and experience and, while the statement has often been made that most difficulties are mechanical, it must be remembered that those mechanical difficulties have been, and can be, satisfactorily eliminated only by chemists with mechanical ability.

Concentrations and viscosities are most important factors. It must also be remembered that cellulose silks are produced by a multistep process, and that, finally, the cellulose must be regenerated as such, but in form of a thread with sufficient strength, tenacity, and durability.

The conversion of cellulose into a compound which is soluble in some solvent and the regeneration of the same

cellulose in its purest state with physical properties resembling genuine silk require not only knowledge of the compound cellulose, which can be acquired only by patient and intensive research, but also a study of practical mechanical research.

For the past decade Europe could draw on cheap and efficient labor. Father, son, and grandson worked in the same plant, even in the same plant department. Their skill and efficiency were so highly developed that there was no necessity for automatic devices and combination of two or more chemical steps. To-day we work with an independent class of labor, a labor body which changes permanently, and therefore the cost of production increases automatically. New kinds of apparatus are devised which have almost revolutionized the cellulose-silk industry. And again, it was America who took the leadership in centrifugal spinning on a commercial scale.

Many plants are still operating by collecting the untwisted filaments onto spools or drums. Without any question, this method produces a high-grade silk, but it is wasteful. Centrifugal spinners, therefore, replace the older method, but with this replacement new factors enter the field. The process must be better controlled, and the composition of cellulose solutions and setting bath changed. More research, mechanical ingenuity, and tremendous initial cost of installation and upkeep of plant are required.

The scope of the cellulose-silk industry can be seen by the quantities used. In 1922 about 23,000,000 pounds of cellulose silk were produced. This is about 3 per cent more than genuine silk. It is true that cellulose silk will never replace the genuine silk, but, at the same time, the textile industry realizes that this relatively new fiber gains importance every day. It produces not only the most beautiful textures, but it lends itself to limitless possibilities. Regardless by which process the cellulose silk is produced, each has a splendid market of its own.—Journal of Industrial and Engineering Chemistry.

The Ionamines: For Acetate Silk

By ARTHUR G. GREEN, F.R.S., and KENNETH H. SAUNDERS, B.Sc.

A Paper Read Before the Society of Dyers and Colourists, and Published in the Journal of the Society

(*Concluded from page 378.*)

This is effected in a very similar manner to the diazotization and development of direct cotton colors—*e. g.*, Primuline. Owing, however, to the greater resistance offered by acetyl-cellulose to the passage of chemicals into the fiber, the operations require more time for their completion. The diazotizing bath consists of a solution of three parts of sodium nitrite and ten parts of hydrochloric acid in 1,000 parts of water. Diazotization is usually complete in five minutes. The silk is then washed free from acid before it is entered into the developing bath.

It is interesting to note that only unsulphonated phenols or amines can be employed as developers; sulphonates, as, for example, R salt, will not penetrate the fiber substance. The most generally useful developers have been found to be *b*-naphthol, resorcin, and *b*-oxynaphthoic acid. Employing these with different Ionamines, a wide range of shades is obtained. These shades are remarkably fast to washing, while the fastness to light is in general satisfactory, and in same cases very good. Comparing the developed shades from any particular Ionamine, those most resistant to light are usually obtained with resorcin, while those with *b*-oxynaphthoic acid come next. Basic developers such as *meta*-phenylene diamine are open to the objection that they are liable to be taken up in excess by the fiber, and subsequently mark off upon white material. This fault might possibly be overcome by using a sufficiently weak bath. Ethyl-*b*-naphthylamine gives violet to blue with several of the Ionamines, but the colors are not sufficiently fast to light for most purposes.

For the production of purple, blue, and black shades the best developer is *b*-oxynaphthoic acid. In using this developer it is important to note that it gives deeper and faster shades (especially to light) when employed in a slightly acid solution. In making up the bath the *b*-oxynaphthoic acid is dissolved with sodium carbonate or caustic soda diluted to the required strength (about one part in 300 parts of water), and then dilute acetic acid is added cautiously until a slight acid reaction on blue litmus paper is obtained.

b-Naphthol is used in weakly alkaline solution, and resorcin without any addition.

Owing to the slow penetration of the developer into the acetyl cellulose, it has been found perferable to employ the developing baths warm (between 50 and 60 deg. Cent.). Development is then complete in five or ten minutes. Underdevelopment, which is more liable to occure in cold baths, leads to shades which are much less fast to light. The following table shows the shade obtained by four Ionamines:

	Ionamine			
Developer	A	B	H	L
Direct	Yellow	Orange	Orange-yellow	Dull Yellow
Resorcin	Reddish-brown	Reddish-orange	Reddish-brown	Purple-brown
b-naphthol	Reddish-purple	Scarlet	Reddish-purple	Purple
b-Oxynaphthoic Acid	Navy blue to black	Crimson	Purple	Bright blue

Dyeing of Union Materials

The Ionamines should find important uses in the dyeing of mixed materials.

Owing to the fact that most direct cotton colors have no affinity for acetate silk, while the Ionamines have a strong affinity for this fiber but none for cotton, it is possible to obtain very interesting effects upon mixed materials, such as hosiery consisting of cotton and acetate silk, or cotton fabrics having designs in acetate silk. By a suitable selection of direct cotton dyestuff and Ionamine, the two fibers can be dyed either in different colors or in a solid shade. This can be done either in a single bath or by "cross-dyeing." For example, cotton and acetate-silk hosiery can be dyed a deep solid black by employing a single dye bath consisting of a suitable diazotizable cotton black together with Ionamine A. The dyeing is carried out in a slightly alkaline bath at about 75 per cent, with addition of about 20 per cent of salt, the goods being subsequently diazotized and developed with *b*-oxynaphthoic acid. Alternatively, the material may be dyed first with the Ionamine from an acidified bath, which is then rendered alkaline with sodium carbonate, and the cotton dyestuff added. For example, to obtain a two-color effect, Ionamine B and Chlorazol Sky Blue 2F can be employed without subsequent development. The silk will take a bright orange shade, while the cotton is dyed blue. If the mixed material is dyed from a neutral or alkaline bath containing Ionamine L and Primuline, and is subsequently developed with *b*-oxynaphthoic acid, the acetate silk will be dyed blue, while the cotton assumes a bluish red.

Towards other qualities of artificial silk, such as viscose silk, the Ionamines behave in the same way as towards cotton—that is to say, they exhibit for them little or no affinity. Since, moreover, these fibers are readily dyed with direct cotton dyestuffs, it will be seen that two-color effects or "shots" are obtainable upon mixed fabrics containing these two kinds of artificial silk by making use of the same methods as above.

With woolen unions the case is quite different. It has already been explained that the Ionamines dye wool like ordinary acid dyestuffs—that is to say, without undergoing hydrolysis. They can therefore be dyed upon an acetate silk and wool mixture in combination with other acid dyestuffs. For example, if such a mixture is dyed from an acid bath with Ionamine B and Coomassie Navy Blue, the silk will be dyed orange and the wool navy blue to black.

Natural silk appears to be dyed by the Ionamines partly in the hydrolyzed and partly in the unhydrolyzed condition, but the matter has not been fully studied.

In the application of the Ionamines to the printing of acetate-silk materials little work has yet been done, but preliminary experiments indicate their applicability in this direction. It is only necessary to print upon the material a thickened solution of the Ionamine acidified with an organic acid, dry, steam for five minutes, and wash off, when the color is found to be fixed. The patterns thus obtained can be subsequently diazotized and developed in the same manner as already described.

The peculiar properties of the Ionamines, and the position which they occupy in combining the properties of both basic and acid dyestuffs, renders it probable that other uses may be found for them outside the scope of the present paper.

The authors desire to express their thanks to various members of the research staff of the British Dyestuffs Corporation for assistance. They are further indebted to G. H. Ellis, of the British Cellulose Company, for a beautiful collection of dyed samples illustrating the process.

At the end of the paper a demonstration was given in which the following experiments were shown:

1. A skein of acetate sik was dyed with Ionamine L and developed in three colors—red, violets, and blue, thus producing a rainbow effect.

2. A strip of calico, upon which had been embroidered diamonds if acetate silk dyed with six Ionamines, was diazotized and developed with *b*-oxynaphthoic acid. The following colors were obtained:

Ionamine A	Black
Ionamine B	Red
Ionamine L	Blue
Ionamine G	Crimson
Ionamine GA	Maroon
Ionamine H	Purple

3. Two pieces of hosiery material composed of alternate stripes of acetate silk and cotton were dyed in single baths consisting of the following:

A	Ionamine MA and Chlorazol Green
B	Ionamine KA and Chlorazol Sky Blue

In piece A the silk was dyed yellow, the cotton green.
In piece B the silk was dyed red, the cotton blue.

4. Three stockings composed of acetate silk and cotton were dyed as follows:

A—In a bath containing Ionamine A alone.
B—In a bath containing a diazotizable cotton black alone.
C—In a bath containing both Ionamine A and the diazotizable cotton black.

All three samples, after dyeing, were diazotized and developed together in *b*-oxynaphthoic acid.

In sample A the silk was dyed black, the cotton being left white.

In sample B the cotton was dyed black, the silk being only slightly tinted.

In sample C both silk and cotton were dyed black.

Proceedings of the American Association of Textile Chemists and Colorists

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MEETING OF NORTHERN NEW ENGLAND SECTION

The last meeting of the season for the Northern New England Section was held at the Engineers' Club, Boston, on Saturday, April 28. There were about forty-five members and guests in attendance.

The first speaker of the evening was R. O. Fernandez of the Merrimac Chemical Company. He spoke on the subject, "Carbonizing with Chloride of Alumina." His paper follows:

CARBONIZING WITH CHLORIDE OF ALUMINA

By R. O. FERNANDEZ, *Merrimac Chemical Company*

When your Chairman requested that some representative of our company should present a brief paper on carbonizing with chloride of alumina, we were not prepared to take up the cudgel in its favor to the exclusion of the other two, sulphuric and muriatic acid; for we supply large quantities of both of the latter to the New England textile trade. Chloride of alumina, however, possesses valuable properties which are perhaps not generally recognized.

PROPERTIES

Chloride of alumina is usually supplied to the woolen manufacturer or job carbonizer as a solution, the strength of which is about 50 per cent $Al_2Cl_6 . 12H_2O$. The specific gravity of this solution is 1.283 corresponding to 32 deg. on the Baume scale. More concentrated solutions may crystallize in containers during the winter months. The containers are carboys or tight barrels. For those desiring a dry material or in cases where a saving in freight is worth while, the crystallized salt is available. Anhydrous aluminum chloride is too expensive to be considered in this connection. Chloride of alumina (a salt of a strong acid and a weak base) is, of course, strongly hydrolized in aqueous solution, and reacts acid to most indicators; tropeolin OO and Congo Red are not affected. Both solution and crystal are non-corrosive, non-poisonous, are not regarded as a fire hazard, and may be shipped without railroad regulation.

HISTORY

Chloride of alumina as a carbonizing agent was first used in this country in the early eighties after successful trials abroad. Its use has increased yearly until at present at least 20,000 tons of wool are carbonized by this process in New England alone. The change from acid to chloride of alumina carbonizing required few changes in equipment and its introduction met with little resistance for this reason.

PROCESS OF CARBONIZATION IN BRIEF

The process of burr removal by carbonization either of loose wool or piece goods, you are all undoubtedly

familiar with. It consists briefly of immersing the wool in a dilute solution of chloride of alumina or acid. extracting first with squeeze rolls and then centrifuging. Drying and baking decomposes the vegetable matter. In piece goods the burrs are crushed by a dry mill, and in raw stock by a specially designed burr crusher with corrugated steel rolls and beaten out in a willow or duster. In acid carbonization the wool is then neutralized with dilute alkaline and dried.

The Chemistry of Carbonization

If the action of the chemicals used for carbonization could be confined to the vegetable matter only (burrs, shives, slivers, etc.), the problem of carbonization would be greatly simplified. The wool fiber, however, undergoes the same treatment as the burr for better or for worse (oftentimes worse), but the fiber performs a necessary function as a vehicle for the carbonizing agent. It is not likely that sufficient carbonizer could be absorbed in the saturating vat by these hard, woody foreign materials for their carbonization. Then to judge the efficiency of a carbonizing agent we must note its effect not only on the burrs but on the wool itself.

In order to compare the effects of chloride of alumina and sulphuric acid carbonizing processes on the wool fiber, I was able to arrange to have a lot of South American cross-bred wool carbonized by both methods. The results are shown by the samples that are submitted. The chloride of alumina carbonized stock is whiter and more lofty. On examining fibers under the microscope, the fiber shows a marked roughing up after sulphuric acid treatment which is not at all surprising in that an almost identical acid treatment is a necessary preliminary process in the manufacture of felt. The fibers from the chloride of alumina process are smooth and glossy and show an undisturbed scale structure.

The chemistry of the process of carbonization is the dehydrating action on cellulose of dilute mineral acid and subsequent drying. Hydro-cellulose is the decomposition product which, though its structure is the same as that of the original cellulose, possesses none of its strength and crumbles away at the slightest pressure. Chloride of alumina furnishes the necessary acid during the carbonizing process in the dryer, first by hydrolysis while the wool is moist, and then by decomposition after the wool reaches the hot end of dryer. An extremely finely divided, inert, hydrate of alumina remains in the wool, which is dusted out in subsequent treatment.

A sample of chloride of alumina carbonized raw stock after crushing and dusting was examined for total alumina, by extracting with boiling N/2 HCl. A mere trace of alumina was found 0.05 per cent total oxide, showing the complete removal of alumina mechanically. The complete removal of alumina is regarded by some as essential where dyeing is to follow. In piece goods the removal is certainly more difficult, and some manufacturers go to the extent of soaking in dilute muriatic acid and subsequently neutralizing.

The hydrochloric acid liberated during carbonization is largely volatilized out of the fiber at the working temperature 240 to 260 deg. Fahr. The amount remaining, though it may not be in actual chemical combination with the wool, is extremely firmly held. An analysis of a sample of carbonized stock showed 2.62 HCl. There seems to be some difference of opinion as to the effect of this acid on dyeing operations. A large carbonizing company has been turning out aluminum chloride carbonized stock for years and they state emphatically that such stock gives general satisfaction. Some companies, however, neutralize before dyeing, contending that more level effects are obtained This acid cannot be disregarded if mixed cotton and woolen goods are to be manufactured, as even a slight amount of mineral acid causes tendering. Neutralization must follow. A case of rusting of card clothing by residual acid in raw stock has come to the attention of the writer, but it was found that the baker was being operated at only 180 deg. Fahr. due to low steam pressure. Although carbonization takes place at these low temperatures, it is not advisable to so operate, for the undecomposed chloride of alumina remaining in the fiber may interfere with subsequent dyeing operations.

Carbonization with Sulphuric Acid

In chloride of alumina carbonization it is evident that the carbonizing action is purely one of dehydration. Sulphuric acid in carbonization, if ideal, should react in a similar manner, but unlike the hydrochloric acid from the hydrolysis and decomposition of chloride of alumina, sulphuric acid is an oxidizing agent, and that it does actually oxidize is quite evident by the fumes of SO_2. from the baker. That this oxidation is entirely due to action on the relatively small amounts of vegetable matter in the wool is doubtful, and it is likely that the slight darkening obtained with sulphuric is due to actual oxidation of the wool fiber. The action of heat in chloride of alumina carbonization expels the hydrochloric acid, while the action of heat in sulphuric acid carbonization concentrates the acid. The destructive action of concentrated sulphuric acid on all textile fibers is well known.

Carbonizing Dyed Piece Goods

In order to retain the fine spinning and weaving qualities of uncarbonized wool, the woolen manufacturer often defers carbonizing until after weaving. And to avoid the vagaries that carbonizing may cause in the dyehouse, carbonizing may be deferred until after dyeing. If the latter be the case, the dyer must select his dyes from tables which indicate those which are fast to carbonizing. These tables are published by dye manufacturers and are complete with regard to sulphuric acid carbonization. All those dyes fast to acid carbonization are implied to be fast to chloride of alumina, and no restrictions are made as to the use of chloride of alumina. This hardly confirms our own observations. It is true with regard to the run of acid dyes, but chloride of alumina has a marked effect where lake formation is possible. A dulling and deepening of the shade is noticed with Patent Blue V, Metanil Yellow, and Chromotrope 6B. A tendency to decompose Naphthol Green B was also noted. This is not remarkable in that the latter is an iron salt of a nitroso compound. With the exception of Naphthol Green B no actual destructive effect of chloride of alumina on dyestuffs has been observed.

With the sulphuric acid an actual destructive effect was observed in the case of chrome colors. Alizarin V was badly reddened after acid carbonization, and Anthracene Brown W was badly yellowed. It is possible that the acid exerted a solvent action on the chrome which profoundly affected the color.

Until more detailed information in regard to fastness to chloride of alumina carbonization is made available by the dye manufacturers, the dyer himself must test the color in this respect by sewing the dyed yarn directly into the gray piece and noting tendencies to dull or bleed in the carbonizing process.

The action of chloride of alumina on dyed wool, as far as acidity is concerned, would be similar to dilute sulphuric acid. The color of acid-sensitive dyes, however, is usually restored on neutralization. Dilute acids as a rule exercise no undesirable effects, as most wool dyes are applied in acid solution. The tendency of chloride of alumina like other aluminum salts is to act as a fixing rather than a stripping agent. The troubles with bleeding and stripping that sometimes occur in sulphuric acid carbonization are not brought about by the action of dilute acid in the saturating vat, but by the concentration of the acid in the dryer. Here the dyestuff is not only subjected to the solublizing action of sulphuric acid due to sulphonation but also to the oxidizing action at these temperatures and concentrations.

The inaction of chloride of alumina to wool dyes is not only of advantage to the carbonizer of piece goods, but also to the carbonizer of shoddy, where redyeing may be avoided.

Other Carbonizing Agents

As for other carbonizing agents, magnesium chloride requires too high a temperature to bring about its decomposition in the dryer. Hydrochloric acid gas requires special equipment and it is difficult to bring about intimate contact between gas and burr.

Process Using Chloride of Alumina

Wool for chloride of alumina carbonization must be scoured and the soap thoroughly rinsed out, as otherwise aluminum soaps form which may act as a resist in future dyeing operations. In operation the chloride of alumina process resembles the acid process. The acidity of the saturating vat must be followed by titration. Wool exercises a selective absorption for acid in chloride of alumina solutions; in other words, wool removes hydrochloric acid more rapidly than alumina, and acid must be added at intervals to reestablish the initial ratio of hydrochloric acid to alumina in the solution. This addition is usually made when the level of the tank has fallen so that it is necessary to replenish the carbonizer. Thirteen-gallon carboys of liquid carbonizer 32 deg. will make up about fifty gallons of 10 deg. Be. liquor. The practice is to add water and then chloride of alumina until about 10 deg. Be., titrate with standard acid, and add the required amount of muriatic acid 22 deg. The titration is simple. The standard acid and a calibrated measuring glass are furnished by the chemical manufacturer, the calibration depending on the dimensions of the saturating tank. The ounces of muriatic acid 22 deg. necessary to add per inch of liquor is simply five less than the number of cubic centimeters of standard acid used in the titration. With reasonably uniform operation the amount of acid bears a direct relation to the amount of fresh carbonizer added and once the relation is established the test may be dispensed with. The goods after a brief soaking are then squeezed and wrung as dry as possible in a hydro extractor (preferably rubber lined). The carbonization takes materially longer than drying, and the best conditions are those in which the wool is not exposed to the higher temperatures of the baker until thoroughly dried. In carbonizing raw stock the operation is often conducted in a single dryer, the temperature of the wet end being several degrees below the highest tempera-

ture. With piece goods the goods may be dried on steam-heated drying cans. For complete carbonization the stock should be baked fifteen minutes at 250 deg. Fahr. The removal of carbonized burr is purely a mechanical affair. Neutralizing agents when necessary are weak solutions of soda ash, or better, ammonia.

As for the consumption of chemicals in the chloride of alumina process, one pound of liquid carbonizer will carbonize about five pounds of wool. This is much better than the average obtained at some plants, where the liquors from the hydro extractor are allowed to run to waste, a highly undesirable situation from their standpoint. The ratio of muriatic acid 22 deg. to chloride of alumina used is about one pound to ten pounds.

As far as costs are concerned, chloride of alumina carbonizing is slightly more expensive than acid, but in the opinion of chloride of alumina users, the results obtained and the feeling of safety with respect to fiber condition more than offsets the difference in chemical costs.

Following this speaker came Frank Biery, whose topic was "Carbonizing Dress Goods with Aluminum Chloride." His paper follows:

CARBONIZING DRESS GOODS WITH ALUMINUM CHLORIDE

By Frank Biery, *Pacific Mills*

The operation of carbonizing has been known and in practical use for a great many years. It has now become indispensable to the manufacture of woolen and worsted goods, and being a chemical process is only successful when carried out under certain fixed limits and conditions, so that the removal of staws, burrs, and other foreign matter can be brought about without injury to the fabric.

The operation consists of passing the pieces in the open width through a solution of aluminum chloride, at the necessary strength, saturating thoroughly, and passing through padder rolls, squeezing it uniformly, and giving the pieces a preliminary drying over a set of dry cans, Monel metal preferred, liberating the water vapor before entering the carbonizing oven, which consists of two compartments, the first at a temperature of about 220 to 230 deg. Fahr., completing the drying operation and carrying off through outlet in top by means of fan, any vapor, the removal of which is highly important, because of liability to cause what is known as carbonizer stains, and passing into second compartment at a temperature of 240 to 250 deg. Fahr., where the carbonizing action is completed.

The hot air in the above machine is circulated through the pieces by means of a series of large fans, my personal objection being its great length and consequent large area of floor space, and the tendency of fans to throw oil on pieces, whereas a smaller carbonizer, one compartment with a series of perpendicular steam coils, taking up about one-quarter of floor area, will do the same work in an equally efficient manner.

The strength of carbonizing liquor and speed of carbonizer varies according to weight and kind of pieces, from light serges, and operated at a speed about fourteen yards per minute to heavier serges and tricotines, same strength of liquor, and speed averaging about eight yards per minute.

The next important step is the neutralizing, and after considerable experience with padder machines, open washers and dollies, I have been thoroughly convinced that the dye kettle gives the best results for pieces carbonized in gray, because it is possible to neutralize and dye in one operation, removing one great cause of poor results, namely, allowing wet pieces to lie around in boxes.

Enter gray pieces into dye kettle. Boil in a dilute solution of muriatic acid, and proceed with dyeing operation—that is, for light weight pieces—but if pieces are heavier or of a men's wear type, or are to be dyed with dyestuff of a cyanon nature, or any dyestuff susceptible to acid, a further boiling out with Glauber salt, and wash in dolly with lukewarm water about 100 deg. is necessary. This will produce the desired results.

Pieces carbonized in color should be washed in dolly at a temperature of 110 deg. for a half-hour, and when returned to open width, neutralized in padder with a small amount of ammonia added, passed over a vacuum extractor and dried.

Summing up, the important features of aluminum chloride carbonizing to produce good results are:

Saturate pieces thoroughly, eliminate undue condensation in carbonizing oven, keep heat as near uniform temperature as possible, neutralize carefully, and handle pieces in wet state as quickly as possible.

Miles R. Moffatt was the last speaker. His paper follows:

CARBONIZING WORSTED PIECE GOODS

By Miles R. Moffatt

The object of carbonizing is to completely eliminate from the goods vegetable matter which otherwise would have to be removed by hand burling. The process to be described consists of (1) saturating the cloth with dilute sulphuric acid [aluminum chloride is also used in some

mills, but its use will be described by others later]; (2) drying; (3) carbonizing; (4) beating; (5) neutralizing.

The necessary apparatus comprises a saturation tank of wood, lead-lined and fitted with immersed rolls, and either two pairs of lapped wooden squeeze rolls or with one pair of rubber rolls, and a slotted suction pipe. The weight of dilute acid left in the cloth should not exceed the weight of the cloth. Sulphuric acid of 5 to 7 deg. Tw. is used to saturate the cloth, and to insure more even penetration the acid is slightly warmed. The drying chambers may be either two or three in number, the temperature of the first being kept at 180, the second at 180 to 200, and the third at 200 to 212. Too high heat in the first chamber causes too rapid evaporation, with resultant unevenness in shade. In each chamber the cloth is conducted alternately up and down over rolls, the top set of rolls being driven. The first twelve rolls with which the cloth comes in contact should be lead-covered or enameled. The walls of the drying chambers may be insulated with asbestos or similar material to reduce heat losses. The air is heated by steam coils at one side and a circulation of air is provided by fans. Some makers of carbonizing apparatus pass the vapor-laden air coming from the machine over the incoming fresh air in a suitable economizer, and thereby reduce the heat loss. The evaporating power of the drying chambers is approximately 500 pounds water per hour. From what has been said before, it will be seen that this rate of evaporation means that about 500 pounds of cloth, or, say, 1,000 yards, can be processed per hour. In the fourth or last compartment the carbonizing proper takes place. The temperature here is maintained at 220 to 240 deg. Fahr., which is sufficiently high to cause destruction of all vegetable matter by the concentrated acid without causing the wool to be but very slightly discolored. As the cloth emerges from the machine, cotton fly appears as black fly, which readily crumbles to dust under slight rubbing. To completely thread the machine, from 230 to 278 yards of cloth are required. A seam is about fifteen minutes in passing through. Heat is furnished by coils of 1¼-inch pipe having about 3,500 square feet of heating surface and supplied with steam at 100 pounds pressure. Good efficiency is indicated when about 2.25 pounds steam per pound water evaporated are used. After carbonizing, the cloth contains about 4.75 per cent H_2SO_4.

The next operation is beating. Two strings of three to four double cuts each are run for about fifteen minutes between rapidly revolving flat-edged wheels or discs, the axis of the upper one being mounted on springs. A beating action results which pulverizes the carbonized vegetable matter.

The cloth is now ready for neutralizing, which consists in washing the acid out in a suitable apparatus equipped with a good supply of cold water. Warm water would be better to finish with, but is costly.

The final operations are opening and drying, which hardly need further description.

To return to the beginning, the cloth to be carbonized should be clean and dry. It may be either colored or gray, but if colored care should be taken in dyeing that such dyes are used as are least affected by the carbonizing process. If gray cloth is to be carbonized, all but traces of soap should be absent, lest the carbonizing causes rancidity.

When stops occur in the process, the cloth in the first compartment may later show streaks or bars reaching from selvedge to selvedge where it rested in contact with the lead rolls. White discharge spots on colored cloth also show where the cloth stopped in contact with the brass lugs in the rolls.

The presence of uncarbonized vegetable matter in the finished cloth is an indication of low steam pressure, resulting in poor drying acid carbonizing. In case the cloth is unevenly squeezed free of acid before carbonizing, uneven shades may be cause; but with ordinary care the process gives quite satisfactory results on medium-weight goods.

Discussion of Papers

In opening the discussion following the presentation of the papers the Chairman spoke of John Bannan's great interest in the topic and asked him to give some of his experiences. Mr. Bannan replied in brief and interesting manner. He mentioned his belief that impurities in the sulphuric acid used for the carbonizing might be a possible cause for some of the mystic spots often found on carbonized colored goods, the impurities having a discharging effect upon the color.

Mr. Christison asked Mr. Fernandez if he thought the use of aluminum chloride for carbonizing goods which must be soaped or slightly fulled, would produce undesirable results through the formation of aluminum soaps.

Mr. Fernandez replied that he would hardly suspect any trouble in this respect if the goods had been properly baked at 250 deg. Fahr. in carbonizing. The alumina is left as an inert and insoluble powder under these conditions.

Mr. Bannan asked if chloride of alumina could be favorably advocated for use with raw stock. Mr. Fernandez showed two sets of samples of raw stock which had been carbonized in a comparative way with chloride of alumina and with sulphuric acid. The better color of the samples done by the aluminum chloride was very evident.

Mr. Spurr inquired of the first speaker what he considered to be the cause of white, dye resisting spots, so-called acid spots, on carbonized goods.

Mr. Fernandez replied that he believed them due to improper conditions, as of temperature of ventilation in the dryers.

Both Mr. Spurr and Mr. Bannan gave further interesting bits of experience with carbonizing. Mr. Bannan spoke of two cases when trouble was given, in one case due probably to allowing the acid to collect in pockets or folds in the imperfectly squeezed goods, in a second case by improper temperature in the dryers. He also spoke of the harmful effects of sulphuric acid upon the shades of some colors like Chrome Browns. The acid carbonizing process yellows served such, like Anthracene Brown W and the original color is not restored by subsequent neutralization with ammonia.

Mr. Fernandez showed several samples illustrating this effect of the acid on some colors. He also showed others in which the aluminum also caused some change in shade.

Winthrop C. Durfee suggested that the yellowing of browns by the acid might be explained on the basis of destruction of the color lake between the dye and the mordant which neutralization of the acid did not re-form. Mr. Durfee also gave experiences before the practice of adding hydrochloric acid to the aluminum chloride carbonizing bath became common.

Mr. Bannan mentioned the acidity frequently encountered in "neutralized" carbonized stock and wondered why it need be so.

Dr. H. C. Chapin mentioned experiments along this line which he has been working upon. It was his opinion that there was a considerable time factor involved in eliminating the acid from raw stock by washing and neutralization. A cold bath would very probably take much longer time than a warm one to accomplish the purpose.

Mr. Moffatt spoke of experiments connected with the acid absorbing power of wool. By noting the drop in level of the dilute acid caused by saturating and squeezing a given number of yards of cloth in process, and the bit of strong acid left in the cloth after drying was completed. Analysis of samples in the laboratory for acidity by soaking twelve hours in distilled water gave an acid value agreeing fairly well with the computed value from the drop in level. However, if the samples were steeped longer more acidity developed.

Dr. Chapin stated his observation that acidity could be detected after days of soaking of the samples.

Mr. Spurr called attention to the article in Hummel's book where it is mentioned that even after five to six steepings acidity might be produced.

Mr. Christison had made similar observations. He said his practice was to add about 10 per cent excess alkali in titrating acidity in fabrics. After three to four minutes the excess alkali could be titrated back and no subsequent acidity would presumably be encountered. He further said that he thought for successful work in carbonizing acid soaked goods should be dried before baking.

Mr. Spurr spoke of a company which had continued successful work in carbonizing with sulphuric acid under apparently crude conditions. The goods were run out of the acid into an open room kept at about 170 to 180 deg. with hot air. All moisture and fumes escaped into this room. They then ran directly into a baking room kept at a temperature of 220 deg. Fahr. He also recalled cases where he had trouble in getting rid of the carbon specks in the beater and so made use of an old fulling mill in which the goods were kept warm by steam coils under a false bottom.

Mr. Richardson recalled peculiar markings on carbonized goods which at first dyed evenly and later showed regular square discharge areas where the goods had come into contact with bronze fittings in the machines.

Mr. Durfee also mentioned a case of goods dyed with Alizarine Blue or chrome mordant which were light in the center and darker on the selvedges. He thought this condition had been brought about by allowing goods to lie in piles after carbonizing, partially drying before neutralizing so that an increase of acid accumulated on the goods and gave the above result.

Business Meeting

At the conclusion of the discussion a short business session was held.

The first matter to be considered was that of adopting a Constitution and By-laws. It was voted to have such, and the following was the final form approved and adopted:

CONSTITUTION

The Northern New England Section shall act under the terms of the Constitution of the American Association of Textile Chemists and Colorists.

BY-LAWS

Officers

Section 1. The Officers shall consist of a Chairman, a Secretary and a Treasurer, to be elected at the last regular spring meeting of the Section and to hold

office for one year, and four members of a Sectional Committee, two to be elected each year at the last regular spring meeting, and to hold office for two years.

Sec. 2. In the absence of the Chairman the Treasurer shall preside at the meetings of the Section and shall perform all the duties of the Chairman.

Sec. 3. The Secretary shall keep the minutes of the meetings of the Section, issue notices of all meetings and conduct the correspondence and keep the records of the Section. He shall perform such other clerical duties as may be assigned him by the Chairman or as may pertain to his office. His records shall be open to the inspection of the Council at all times. A yearly report shall be rendered the Secretary of the parent association prior to December 1.

Sec. 4. The Treasurer shall collect all assessments and other moneys, pay all bills approved by the Chairman.

Sec. 5. The Chairman is authorized to hold a special election at a regular monthly meeting, to fill any vacancy which may occur.

AMENDMENTS

These By-laws may be amended at any regular meeting by a two-thirds vote of those voting, two weeks' notice of proposed amendment having been sent to each member. Proposed amendments must be signed by 10 per cent of the members of the Section.

A nominating committee shall be appointed before the last regular spring meeting to nominate members for the various offices. The Treasurer's yearly statement and the Nominating Committee's recommendation shall be mailed to the Section before the last spring meeting.

In accordance with the provisions of the By-laws previously adopted the Chairman appointed as a nominating committee Mr. Moorhouse, chairman; Thomas Biery, Dr. Pratt. After due deliberation this committee presented the following names for officers:

Chairman—Hugh Christison.
Secretary—Arthur K. Johnson.
Treasurer—Miles R. Moffatt.

Other four members of the Sectional Committee:

T. F. Biery for two years.
James Richardson for two years.
John Bannan for one year.
Mr. Burne for one year.

Winthrop C. Durfee assumed the chair. Dr. Chapin moved the nomination be accepted. The motion was seconded by Milton J. Washburn. Mr. Durfee instructed the Chairman, Mr. Moorhouse, to cast one ballot for those names, which he did. The above were then declared elected to serve.

The Treasurer then read the following report as covering all money received from the National Treasurer, Mr. Durfee, and spent since the formation of the Section in March, 1922:

Receipts

December 14, 1922—Check from W. C. Durfee, Treasurer	$100.00

Expenditures

January 11, 1923—Paid A. K. Johnson, clerical expenses	$22.89	
January 11, 1923—Paid for three guests of Section, dinners	6.00	
January 20, 1923—Paid A. K. Johnson, clerical expenses	10.85	
March 12, 1923—Paid A. K. Johnson, clerical expenses	9.22	
April 27, 1923—Paid A. K. Johnson, clerical expenses	5.20	
Total expenditures	$54.16	
Balance on hand	45.84	
	$100.00	$100.00

The report was voted upon and accepted.

Since and including March 4, 1922, the Section has held six meetings. The maximum attendance has been 63, the minimum 45, and the average approximately 53.

The last business concerned an outing for the Section in June. The corrected returns of the straw vote on this question show out of 175 cards sent out 34 positively desiring an outing, five neutral and seven not in favor. The Section, in the light of these returns, voted to have an outing to be in charge of a special committee appointed by the Chairman.

The following were appointed to serve as the Sectional Outing Committee:

Mr. Fisher, Chairman.
Walter Durfee.
John Bannan.

The meeting adjourned to an informal social gathering at about eight o'clock.

CONCERNING THE YEAR BOOK

Work on the 1923 Year Book of the Association has progressed to a point where those in charge of its publication hope to have it ready for the printer's hands within the next couple of weeks. There are still many members who have not returned to the Secretary the questionnaire recently mailed requesting information in regard to their activities for use in compiling statistics to be published in the Year Book. Any members who did not receive this questionnaire or who failed to return it when received, should communicate with the Secretary who will be glad to furnish a duplicate copy.

It is expected that the cost of publishing and distributing the Year Book, and probably considerable revenue in excess of this cost, will be received from advertisements therein. The matter of advertising solicitation has been left in the hands of the Howes Publishing Company. It is understood that they have made a reasonably complete canvass of logical advertising prospects, but it is possible that individual members might know of certain firms who would be glad of an opportunity to advertise in the Year Book but have not been approached. Members who are in close touch with firms supplying dyestuffs, chemicals or equipment to the textile industry could serve the Association by bringing the matter of advertising in the Year Book to their attention.

The following letter from the President of the Association which has been mailed to a representative list of advertising prospects covers the situation:

To the Friends of the American Association of Textile Chemists and Colorists:

At a recent meeting of the Council of the Association it was voted to publish a Year Book, which would contain a list of the officers, a complete list of all the members, reports of the Secretary and Treasurer, data in regard to the Local Sections, the Constitution and By-laws of the Association, the standard methods of testing the fastness of dyed fabrics which have been proposed by the Research Committee, and such other data as may be of general interest to the members.

As considerable expense will be involved in this project, it has been thought desirable to secure the necessary funds for this purpose by devoting a number of pages to advertising. The Council will furnish the text material for this annual but the matter of securing advertisers and the publication of same has been turned over to the Howes Publishing Company, who will act as our agents.

This is purely an Association matter and the Council will appreciate any co-operation which may be rendered through the financial assistance of the advertisers.

Sincerely,
L. A. Olney, President.

Any members who have suggestions concerning the Year Book either as regards advertising or text matter are urged to communicate with the Secretary without delay.

Walter E. Hadley, Secretary,
5 Mountain Avenue, Maplewood, N. J.

NOTICE OF MAY MEETING, NEW YORK SECTION

The final meeting for the year of the New York Section of the American Association of Textile Chemists and Colorises will be held Friday, May 25, at the Newark Athletic Club, 16 Park Place, Newark, N. J.

A private room has been reserved for this occasion where an excellent dinner will be served at 6.45 p. m. for those who care to attend. The meeting proper will be held in the same room at 8 p. m., and all who find it inconvenient to be present for dinner are urged to attend the meeting itself.

At this meeting officers for the 1923-24 season will be elected. A nominating committee appointed at the April meeting will present a choice of two or more candidates for each office and, in order that the election may be truly representative of the sentiment of the Section, it is hoped that all members will make an effort to be present.

The speaker of the evening will be Mr. Stewart F. Carter of Jacques Wolf & Co., Passaic, N. J. Mr. Carter's topic will be "The Old Mandarin (or Nitric Acid) Style in Silk and Some Other Matters of Interest in Textile Printing."

The Newark Athletic Club is located a few doors from the Park Place station of the Hudson Tubes. Trains running at ten-minute intervals may be taken from the Hudson Terminal or any of the Hudson Tubes' stations on Sixth Avenue, New York. The running time from New York to Newark is about thirty minutes.

Members from out of town who are in New York or vicinity at the time are cordially invited to be present.

L. C. Lewis, Secretary.

Italian Government, Pending Outcome of Investigation, Will Keep Hands Off Dye Tariff

Minister of Finance, in Special Statement to "Reporter" Representative, Declares New Policy Will Be Based on Recommendations of Technical Commission

Genoa, April 26, 1923.
Special to The Reporter.

THE Mussolini Government will make no attempt to alter the existing Italian dye import tariffs until the views of both dye manufacturers and consumers can be ascertained and an equitable policy worked out. Such is the special statement given to the American Dyestuff Reporter by the Italian Minister of Finance through the General Director of Customs at Genoa.

Italy's conclusions regarding how far she will go in the matter of dye protection will therefore be arrived at in much the same manner as was chosen by the United States, and her final decision will be shaped largely by the findings of a special commission of experts and technical men who are studying the problem from every angle.

Approached directly by The Reporter representative for a statement as to the attitude of the Dictatorship toward domestic dye manufacturers, Premier Mussolini placed the matter in the hands of the Minister of Finance for a reply. This, however, was delayed for several weeks in the hope that the report of the Dye Tariff Investigating Commission could be submitted to the Parliament, and action taken. When it became evident that yet more time must elapse before general sentiment could be crystallized sufficiently to be made official, the following statement was issued:

"The Italian Government regrets being unable to state its official attitude toward the national dyestuff industry as yet, since the question of tariff changes affecting it will only be discussed by the Ministry when the results of the studies and investigations of the special Government commission are known and concrete recommendations made which meet as nearly as possible the wishes of both the domestic dye manufacturers and the numerous dyeing works which would inevitably suffer through too great an increase in the prices of dyestuffs. For the above reasons, the attitude of the Government will be stated only when the right moment arrives. Meanwhile, the dye import tariffs will remain unchanged until further notice."

This statement is regarded as indicative of the seriousness with which the question is viewed and the reluctance to allow the decision to rest with any single group or individual. Incidentally, it must be said that the tendency of the Government has so far been to leave all phases of commerce and industry as free as possible, and that to this end many restrictions imposed during the war have been eliminated. However, it is further apparent that this line of conduct will be followed only so far as it does not conflict with obvious national interests.

The decree that allowed the use only of certain dyestuffs for the coloring of foodstuffs, creams, face powders and other special preparations of personal and domestic use at first occasioned alarm on the part of certain manufacturers, it being feared that sale was also prohibited in the case of products already manufactured, or in course of manufacture, not included in the lists of permissibles. Such apprehensions were soon overcome, however, when it was stated that the new decree does not contain anything that forbids the sale of products already manufactured or in course of manufacture, which may be marketed until present stocks are exhausted. The decree is subject to revisions or additions, and permits the testing of new coloring matters claimed to be harmless when used for coloring foodstuffs, creams, powders, etc.

Through a recent decree the maximum normal daily working time of the employees and workpeople of all industrial concerns and commercial offices, whatever be their nature, cannot exceed eight hours (forty-eight hours per week). This decree is not applicable to the directors of the firms or their commercial travelers. In cases where an eight-hour day would interfere with the technical requirements of the work the above hours can be exceeded on condition that the total time spent does not exceed the limits to be established by another decree, or through a special agreement signed by the interested parties.

When both the employers and employees are agreeable, a period of overtime of not more than two hours per day and twelve hours per week can be added to the normal working hours, on condition that such extra hours be compensated for by an increase of pay over normal of not less than 10 per cent.

Through the recent agreement between Italy and Swizerland, synthetic organic colors in the dry state, with less than 50 per cent of water, such as indigo, the vat colors, the yellow cyanic colors, paying a general customers of 200 gold lire per 100 kilos and a coefficient of majoration of 0.5, will be exempted from such charges in the case of Italy. Indigo, vat colors, cyanic yellows in paste form, with 50 or more per cent of water and paying a general customs of 100 gold lire per 100 kilos and a coefficient of majoration of 0.5, will be treated in the same way.

To the above also belong the synthetic organic col-

TABLE I

	March 6		April 6	
	(lire)	(dollars)	(lire)	(dollars)
Naphthol Yellow	40,000—65,000	2,000—3,250	40,000—65,000	2,051—3,333
Auramine	60,000—70,000	3,000—3,500	60,000—70,000	3,076—3,589
Orange II	20,000—22,000	1,000—1,100	20,000—22,000	1,025—1,128
Nigrosine, water soluble	28,000—35,000	1,400—1,750	28,000—35,000	1,435—1,794
Nigrosine, soluble in alcohol	30,000—38,000	1,500—1,900	30,000—38,000	1,538—1,948
Sulphur Black	7,000—11,000	350— 550	7,000—11,000	358— 564
Acid Black	24,000—28,000	1,200—1,400	24,000—28,000	1,231—1,435
Direct Black	24,000—30,000	1,200—1,500	24,000—30,000	1,231—1,508
Chrome Black	28,000—34,000	1,400—1,700	28,000—34,000	1,435—1,773
Methylene Blue	75,000—90,000	3,750—4,500	75,000—90,000	3,876—4,615
Direct Blue	22,000—26,000	1,100—1,300	22,000—26,000	1,128—1,333
Sulphur Blue	22,000—28,000	1,100—1,400	22,000—28,000	1,128—1,435
Malachite Green	75,000—90,000	3,750—4,500	75,000—90,000	3,896—4,615
Acid Green	60,000—70,000	3,000—3,500	60,000—70,000	3,076—3,589
Direct Green	30,000—36,000	1,500—1,800	30,000—35,000	1,538—1,794
Bismarck Brown	30,000—35,000	1,500—1,750	30,000—35,000	1,538—1,794
Magenta (Fuchsine) Crystals	70,000—80,000	3,500—4,000	70,000—80,000	3,589—4,102
Eosine	50,000—75,000	2,500—3,750	50,000—75,000	2,567—3,876
Ponceaux	25,000—30,000	1,250—1,500	25,000—30,000	1,282—1,538
Methyl Violet	65,000—80,000	3,250—4,000	65,000—80,000	3,333—4,102

oring matters containing substances such as common salt or sulphate of soda in a maximum proportion of 50 per cent, or containing acetic acid, dextrine, etc., the addition of which has only the object of dilution, of fixing the colors themselves, or of stopping their precipitation in the dye bath.

In cases that require an analysis for assuring that the colors do not contain more than 50 per cent of common salt, the importer has the right to liberate the goods and to dispose freely of them after the payment of a deposit of the value of the entrance customs and of the common salt that may be present, in the proportion of 50 kilos of salt for every 100 kilos of color. If the results of the analysis show that the color contains more than 50 per cent of common salt, a difference above the sum already deposited will have to be paid.

The Demand for Colors

The demand for coloring matters continued very fair during the past six weeks, and this was not only the case for the war reparation products but also for imported colors, such as Carmoisine, Naphthylamine Blacks, Guinea Browns, Tartrazine, Milling Reds, Acid Violets, Sulphocyanines, Fast Acid Reds, Benzopurpurines, Benzo Fast Reds, Congo Red, Diamine Catechine, Diazo Blacks, Primulin, Chloramine Yellows and Oranges, Sky Blues, Direct Blues, Direct Grays, Direct Bordeaux, Brilliant Fast Reds, Chrysophenine G, the Ericas, Indigo and other vat coloring matters, Alizarine Reds, Alizarine Blues, Alizarine Yellows and Oranges, etc.

For the above reasons, quite a large field could still be covered by privately imported colors, the war reparation products only closing out business in certain cases. Of such conditions Switzerland took, as usual, the greatest advantage. This country, in some cases, also sold products imported from Germany. The demand was distributed over the cotton, wool, silk, hemp, linen, artificial silk, paper and leather dye works.

Prices of Coal-Tar Dyes

The quotations of war reparation dyes in Table I, per ton in lire and dollars, show the difference brought in the dollar and lira prices at the moment of writing, in comparison with the prices prevailing on March 6 last (the dyes being delivered in kegs from 25 to 50 kilos).

Mordants, Assistants, Dyehouse Products

Through the continuance of the French occupation of the Ruhr district the exports of French caustic soda remained very low during the past six weeks and the United States, England, Spain, Japan and other countries could benefit by the situation, especially as the national production was, as usual, much below the needs. Strange to say, the price of this product fell slightly owing to the lower prices of the national suppliers.

Sulphate of soda crystals, silicate of soda, carbonatae of soda, bichromate of soda and sulphate of copper were very strongly demanded. Some of the lira and dollar quotations are given, per ton at Milan, in Table II.

Some private quotations for dyestuffs at Genoa

TABLE II

	March 6		April 6	
	(lire)	(dollars)	(lire)	(dollars)
Acetate of alumina	1,600	80	1,600	82
Chrome alum	3,500	175	3,500	179
Bichromate of potash	5,900	295	5,900	302
Ferrous sulphate	500	25	500	25
Copper sulphate	2,250	112	2,360	121
Tartar emetic	12,000	600	12,000	614
Aniline oil	13,500	675	13,500	692
White refined glycerine	8,000	400	8,000	410
Glucose, 45 deg. Be	3,900	195	4,000	205
Hydrogen peroxide	2,100	105	2,100	107
Tannic acid, 60 per cent	20,000	1,000	20,000	1,025
Tartaric acid, crystals	13,500	675	13,500	692
Acetic acid, 30 per cent	2,500	125	2,500	128
Formic acid	8,500	425	8,500	435
Hydrochloric acid, 20-21 deg. Be	250	12	250	13
Lactic acid, 80 per cent	6,000	300	6,000	307
Alum	850	42	850	43
Ammonia, 22 deg. Be	1,600	80	1,600	82
Bisulphite of soda, 32 deg. Be	380	19	380	19
Chlorate of potash	3,000	150	3,000	153
Chloride of ammonia	3,000	150	3,000	153
Bleaching powder	900	45	900	46
Nitrite of soda	2,800	140	2,800	143
Yellow prussiate of potash	20,000	1,000	20,000	1,025
Yellow prussiate of soda	16,000	800	18,000	922
Caustic soda, 70/72	1,900	95	1,850	94
Silicatae of soda, 140 deg. Tw	1,000	50	1,000	51
Sodium sulphide	2,750	137	2,750	141
Logwood extract	7,500	375	7,500	384
Yellow dextrine	3,100	155	3,150	161
White dextrine	3,150	157	3,200	164
Farina	2,450	122	2,500	128
Kordofan gum	8,000	400	8,000	410
Indigo, 25 per cent	22,000	1,000	22,000	1,128
Beta-naphthol	19,000	950	25,000	1,282
Industrial castor oil	5,600	280	5,900	302

were as follows per kilo, showing how these competed against the war reparation products: Direct Black, 28 to 33 lire; Nigrosine Crystals, 26 to 30 lire; Chrome Black in powder, 33 to 36 lire; Direct Green, 35 to 40 lire; Eosine, 51 to 75 lire; Orange II, 21 to 24 lire; Methylene Blue, 75 to 92 lire; Liquid Fustic Extract, 7.50 to 8 lire; Logwood Extract, 7.50 to 7.80 lire; Hematine Crystals, 11 to 12 lire.

LOMMEL SUCCEEDS NOBBE IN CAMPBELL IMPORT DEPARTMENT

Announcement has been made by John Campbell & Co., 75 Hudson Street, New York City, to the effect that George C. Lommel has succeeded Paul Nobbe as head of the firm's import department. It is further stated that inquiries for non-competitive foreign dyes will receive prompt attention.

Printing Yarn for Chintz Effects

COTTON yarns intended for the production of chintz effects by weaving should be boiled, bleached, and dried before printing, and boiling out in water alone is to be preferred to the use of alkalies, sulphoricinates or soaps. Caustic alkalies add a certain degree of strength to the fiber; the soaps and sulphoricinates give a more open and more absorbent fiber, but this is to be avoided for the best results in chintz effects. Boiling in water alone is the best course.

The bleaching should not be carried as far for aniline black as for other colors. All methods of bleaching cause some loss of strength to the fiber, and it is, of course, necessary that the fiber should be left as strong as it may be for dyeing oxidation aniline black.

Since the white portions come out very well in contrast with the block in the design, the bleaching may be somewhat milder than could be allowed in other circumstances. A solution of bleaching powder answers very well, but the souring with mineral acids should be dispensed with, making instead an addition of acetic acid, which is without any detrimental effect on the fiber even when the washings may happen to have been badly done. Before the printing, it is always preferable to dry, so as to prevent the colors from running subsequently, and the drying should be done at a moderate temperature.

Although this feature of drying slowly at a moderate temperature may not be worthy of much attention in most instances of printing yarns with ordinary colors, it is of great value in the application of oxidation aniline black. Indeed, for very fine chintz patterns it is sometimes the custom to make more certain of lessening the liability to run by treating the yarns with a solution of acetate of alumina after the bleaching. Yet, by drying carefully, running may be completely prevented.

After the proper preparation of the yarn for printing, the next matter for consideration is the thickening agent to be employed. Complex mixtures are used in many cases, but a gum tragacanth well prepared cannot be beaten. For oxidation aniline black the product should be of a good quality. It is not necessary that the gum tragacanth should be white so long as it is free from pieces of wood and impurities, and offered at a reasonable price. When it has been properly dissolved in water, the resulting paste is cooled and used along with the aniline black mixture in proportions which are controlled by the nature of the design to be printed.

Toning the Black

The aniline black mixture employed may be made up according to any good recipe, using copper sulphate or a vanadium salt, or copper sulphide. Coloring for the guidance of the printer is produced with the aid of Paris Violet, or the following mixture: 10 grams of sulphate of cobalt are dissolved in 55 c.c. of water, and after being suitably thickened are admixed with 10 grams of Naphtine S dissolved in a like quantity of water. A reddish-orange coloration is produced, which, being fast to light, chlorine, and to alkalies, serves also to counteract any tendency of the black to become greenish in appearance. Moreover, this mixture and Paris Violet are about the best means at hand for readily toning the shade of the black. Catechu was used at one time, and is even yet, sometimes, incorporated with the thickening; the subsequent chroming of the black fixes the catechu; the moisture present in the aging chamber invariably caused it to soil the white effects.

After printing, the yarns, arranged on poles, are conveyed to a well-ventilated drying chamber heated to a maximum temperature of 38 deg. Cent. It is a good plan, to avoid the possibility of trouble with the yarns on account of this temperature being unwittingly overstepped, to fix inside the chamber a thermometer connected electrically with an alarm to give warning at any convenient point of a too high temperature. When the yarn has acquired a green color, live steam is admitted to the chamber to provide the moisture necessary for the process of oxidation. Proper and full development of the black can only take place when the warm air is saturated with moisture. The treatment in the chamber usually takes about eight hours.

The yarns are then chromed with a solution of bichromate of soda, either cold, warm or boiling, along with an addition of soda or sulphuric acid, according to the shade of black desired. The addition of soda to the chroming liquor gives the black a bluish tone, but causes the design to become somewhat blurred. The black is deepened appreciably by the addition of sulphuric acid, to the extent of one-tenth of the weight of the bichromate, but the white portions become colored slightly brownish. With regard to the amount of bichromate needed, five grams per liter is a satisfactory quantity, although some printers use a stronger bath, but without gaining any better results. Thorough washing and soaping follow.

The soap used should be of a good quality, without odor; two to five grams per liter of warm water serves for the purpose; an addition of resinate of soda may be made to the soap liquor for the sake of slightly stiffening the fiber; also a little of a direct blue may be added to improve the appearance of the white. By the same means the white may be dyed pink, yellow or green in the soaping liquor. This latter course is a more ready way of producing colored effects than by using the discharge method.—Posselt's Textile Journal.

The Progressive Color & Chemical Company, New York, has been incorporated with a capital of $100,000. The incorporators are G. A. Kuhl, H. Hintze and H. Felix. The company is represented by O. Oechler, 481 Knickerbocker Avenue, Brooklyn, N. Y.

The Hobarton Manufacturing Company, Concord, has just been incorporated, with a capital of $400,000, by E. C. Barnhardt, president of the Gibson Manufacturing Company, Concord; C. A. Cannon, president of the Cannon Manufacturing Company; M. L. Cannon, president of the Cabarrus Manufacturing Company; W. B. Bruton, superintendent of the Gibson Manufacturing Company; E. C. Barnhardt, Jr., and C. A. Wagoner. The new company will build a two-story brick mill for the manufacture of fancy colored cotton goods.

Foreign Dyes Imported Through the Port of New York During April

Compiled by the Chemical Division of the Bureau of Foreign and Domestic Commerce, in Collaboration with the Chemical Division of the United States Tariff Commission

KEY TO ABBREVIATIONS FOR FOREIGN MANUFACTURERS

1—The Six Leading German Companies

A—Actien-Gesellschaft fur Anilin-Fabrikation, Berlin. Founded 1873. Branches in France and Russia.
B—Badische Anilin-und Soda-Fabrik, Ludwigshafen on the Rhine. Founded 1865. Branches in France and Russia.
By—Farbenfabriken vorm. Friedr. Bayer & Co., Leverkusen on the Rhine. Founded 1862. Branches in France and Russia.
C—Leopold Cassella & Co., Frankfort on the Main. Founded 1870. Branches in France and Russia.
K—Kalle & Co., A. G., Biebrich on the Rhine. Founded 1870. Branches in Russia.
M—Farbwerke vorm. Meister Lucius & Bruning, Hochst on the Main. Founded 1862. Branches in France and Russia.

2—The Seven Smaller German Companies

BK—Leipziger Anilinfabrik Beyer & Kegel, Furstenberg near Leipzig. Founded 1882.
GG—Chemikalienwerk Greishem G.m.b.H., Griesheim on the Main. Founded 1881.
CJ—Carl Jager G.m.b.H., Anilinfarbenfabrik, Dusseldorf. Founded 1823.
GrE—Chemische Fabrik Griesheim-Electron, Offenbach on the Main. Founded 1842.
L—Farbwerk Muhlheim vorm. A. Leonhardt & Co., Muhlheim on the Main. Founded 1879. Branch in France.
tM—Chemische Fabriken vorm. Weiler ter Meer, Uerdingen on the Rhine. Founded 1877.
WD—Wulfing, Dahl & Co., A. G. Barmen. Founded 1842.

3—Dutch, Belgian and French Companies

FA—Farbwerk Ammersfoort, Ammersfoort, Netherlands. Founded 1888.
NF—Niederlandische Farbe-und Chemikalienfabrik Delft, Netherlands (Delft). Founded 1897. Branch in Russia.
LG—Lazard Godchaux, of Brussels. (These products are probably compounded largely from the dyes made by A. Wiescher & Co., of Haeren, Belgium.)
P—Societe Anonyme des Matieres colorantes et produits chimiques St. Denis (formerly A. Poirrier), St. Denis, near Paris, France. Founded 1830.

4—Swiss Companies (all at Basel)

DH—Farbwerke vorm. L. Durand, Huguenin & Co. Founded 1871. Branches in Germany and France.
G—Anilinfarben-und Extract-Fabriken vorm. Joh. Rud. Geigy. Founded 1764. Branches in France, Germany and Russia.
I—Geselfschaft fur chemische Industrie. Founded 1885. Branch in France.
S—Chemische Fabrik vorm. Sandoz & Co. Founded 1887.

5—English Companies

ClCo—The Clayton Aniline Co., Ltd., Clayton, near Manchester Founded 1876.
CR—Clauss & Co. (formerly Clauss & Ree), Clayton, near Manchester. Founded 1890.
CV—Colne Vale Chemical Co., Milnsbridge, near Huddersfield.
RHS—Read Holliday & Sons, Ltd., Huddersfield. Founded 1820. (Purchases by British Dyes, Ltd.)
BD—British Dyes, Ltd Founded 1915.
Lev—Levinstein, Ltd., Crumpsall Vale, near Manchester. Founded 1864.
Q—Importations of unknown source, through dealers in colors.

IMPORTS of coal-tar dyes for April totaled 242,022 pounds, with an invoice value of $256,751. The following table shows the monthly imports through the Port of New York for the year 1923:

Month	Pounds	Value
January*	179,309	$185,344
February	191,709	199,640
March	312,809	301,436
April	242,022	256,751

*Not complete.

The four dyes leading in quantity imported were Xylene Light Yellow, Diaminogene Blue, Patent Blue (No. 543), Diazamine Blue BR. Of the total quantity imported in April, 1923, 42 per cent came from Switzerland, 37 per cent from Germany, 18 per cent from Italy, 2 per cent from Canada and 1 per cent from England. Switzerland led for the first time in 1923, indicating that the Ruhr occupation has not seriously affected the supply of raw materials for dye making in that country. Prior to the war Switzerland depended almost exclusively on Germany for these materials. Official statistics for 1922, however, show that she imported crudes and intermediates from France, Great Britain, Poland, Italy, Czecho-Slovakia, the United States and Germany.

The dyes in this report are grouped by Schultz numbers, and in the case of those which could not be identified by Schultz number the classification according to ordinary method of application was adopted. As the pastes and powders of the vat dyes vary widely in strength and quantity, each vat dye has been reduced—in nearly every case—to a single-strength basis.

The designation * for non-competitive and † for competitive in the following report indicates the appraisement bases for the assessment of the ad valorem duty in paragraph 28 of the Tariff Act of 1922. Those dyes without designation are doubtful, pending further investigation.

The ad valorem rate for competitive dyes is based on the American selling price as defined in Subdivision (f) of Section 402 of Title IV; the ad valorem rate for non-competitive dyes is based on the United States value as defined in Subdivision (d) of Section 402 of Title IV of the Tariff Act of 1922.

(*Denotes classification as non-competitive; †denotes classification as competitive.)

Schultz No.	Name of Dye and Manufacturer	Quantity Pounds	Value Dollars	Per Cent by Countries	
9	Direct yellow G—(S)	2,002	.....	Switzerland	100
	†Sun Yellow G				
22	Xylene Light Yellow	12,149	.....	Switzerland	100
	Xylene Light Yellow R Conc.—(S)				
	Xylene Light Yellow 2G Conc. 75%—(S)				

Schultz No.	Name of Dye and Manufacturer	Quantity Pounds	Value Dollars	Per Cent by Countries	
28	Hansa Yellow G	500	.....	Germany	100
	*Hansa Yellow G Powder 100%—(M)				
88	Acid Anthracene Brown	2,757	1,604	Germany	100
	*Acid Anthracene Brown PG—(By)				
	†Acid Anthracene Brown RH Extra—(By)				
121	Erica B	100	.....	Germany	100
	*Erica P Extra (90% coloring matter)—(A)				
222	Janus Yellow	500	.....	Germany	100
	*Yellow IG (Janus Yellow G)—(M)				
240	Janus Red	50	.....	Germany	100
	*Red IB (Janus Red B)—(M)				
250	Milling Orange	551	.....	Germany	100
	†Milling Orange 88—(WD)				
257	Cloth Fast Blue R	111	.....	Canada	100
	†Cloth Fast Blue R—(I)				
265	Acid Milling Black	3,969	.....	Switzerland	100
	Acid Milling Black B652—(G)				
273	**Diaminogene Blue**	10,588	7,766	Germany	85
	*Blue NA (100% standard)—(C)			Italy	15
	*Diaminogene Blue NA—(C)				
274	Diaminogene	7,000	.....	Germany	100
	*Black Extra (100% standard)—(C)				
	(Diaminogene Extra)				
296	Cotton Yellow GI	11	.....	Germany	100
	Benzo Fast Yellow RL—(By)				
297	Benzo Fast Pink 2BL	11	.....	Germany	100
	†Benzo Fast Pink 2BL—(By)				
319	Diamine Scarlet	3,002	.....	Switzerland	100
	Chloramine Red 3B (standard)—(S)				
358	Diphenyd Red	187	.....	Italy	100
	*Chloramine Red 8BS—(By)				
373	Congo Orange	200	.....	Germany	100
	*Congo Orange R (95% coloring matter)—(A)				
392	Toluylene Orange	1,334	1,133	Switzerland	99
	*Direct Fast Orange K—(I)			Germany	1
	†Toluylene Fast Orange GL—(By)				
448	Diamine Bronze R	100	.....	Germany	100
	*Diamine Bronze G (standard 100%)—(C)				
456	Benzo Fast Blue	1,551	2,401	Germany	50
	*Benzo Fast Blue 2GL—(By)			Italy	50
	*Benzo Fast Blue 4GL—(By)				
493	Auramine	441	.....	Switzerland	100
	†Auramine 00445—(G)				
494	Auramine G	1,212	.....	Switzerland	100
	*Auramine G—(I)				
500	Setopaline	660	.....	Switzerland	100
	Setopaline Conc. 707—(G)				
503	Neptune Green	441	.....	Switzerland	100
	†Erio Viridine B Supra 561—(G)				
506	Erioglaucine	1,279	.....	Switzerland	100
	*Erioglaucine AP 545—(G)				
516	Crystal Violet	150	.....	Canada	100
	†Crystal Violet Extra 90%—(B)				
522	Victoria Blue 4R	331	.....	Switzerland	100
	†Victoria Blue 4R (100%)				
523	Fast Green	110	.....	Italy	100
	*Fast Green Bluish—(By)				

Schultz No.	Name of Dye and Manufacturer	Quantity Pounds	Value Dollars	Per Cent by Countries	
524	Acid Magenta	77	.....	Italy	100
	†Acid Fuchsine S Conc.—(A)				
527	Acid Violet 4BN	4,004	.....	Switzerland	100
	†Acid Violet 4BNS Conc. 6-10				
530	Acid Violet	83	137	Switzerland	59
	Acid Violet 6BNG 553—(G)			Canada	30
	†Acid Violet 6BNOO—(B)			Germany	11
	†Acid Violet 10B (100%)—(C)				
	(Formyl Violet 10B)				
537	Methyl Blue for silk	882	.....	Switzerland	100
	†Methyl Lyons Blue 410—(G)				
539	Soluble Blue	20	.....	Canada	100
	†Soluble Blue T (standard strength)—(B)				
543	Patent Blue	14,035	9,458	Germany	100
	Brilliant Acid Blue V—(By)				
	†Neptune Blue BGX Conc.—(B)				
	*Patent Blue V (56%)—(M)				
	*Patent Marine Blue LE—(M)				
545	Patent Blue A	3,449	3,154	Germany	99
	Brilliant Acid Blue FF—(By)			Canada	1
	†Patent Blue A (56%)—(M)				
	†Patent Blue A—(Q)				
546	Cyanol	100	.....	Germany	100
	*Blue FF (standard 100%)—(C)				
	(Cyanole FF)				
553	Eriochrome Cyanine	999	.....	Switzerland	100
	*Eriochrome Cyanine RC 935—(G)				
562	Fast Acid Blue	22	.....	Germany	100
	Brilliant Wool Blue FFR Extra—(By)				
564	Naphthalene Green	993	.....	Switzerland	100
	Naphthalene Green V—(Q)				
571	Rhodamine 6G	3,272	9,364	Switzerland	41
	*Rosazeine 6G Extra (100%)—(M)			Italy	31
	*Rhodamine 6G Extra (100%)—(M)			Germany	24
	*Rhodamine 6G Extra (500%)—(M)			Canada	4
	*Rhodamine 6GD Extra (100%)—(M)				
	*Rhodamine 6GD Extra (500%)—(M)				
	*Rhodamine 6GDN Extra—(M)				
	*Rhodamine 6GDN Extra (500%)—(M)				
	(52% of total quantity is 500% strength)				
573	Rhodamine B	3,883	9,195	Switzerland	57
	†Rhodamine B Extra—(I)			Italy	30
	†Rosazeine B Extra (100%)—(M)			Germany	13
	(Rhodamine B Extra)				
	†Rhodamine B Extra (500%)—(I)				
	(54% of total quantity is 500% strength)				
603	Acridine Orange	518	1,543	Switzerland	85
	Acridine Orange DHE Powder—(DH)			Germany	15
	*Orange NO—(By)				
	(Rhoduline Orange NO)				
606	Phosphine	110	.....	Germany	100
	*Coriphosphine OX Extra (65%)—(By)				
609	Homophosphine	2,033	3,548	Germany	100
	*Auracine G—(By)				
	*Corioflavine GOOO (150%)—(GrE)				

Schultz No.	Name of Dye and Manufacturer	Quantity Pounds	Value Dollars	Per Cent by Countries	
615	Thioflavine S	10	.....	Germany	100
	†Direct Yellow S (standard 100%)—(C) (Thioflavine S)				
618	Thioflavine T	160	309	Germany	70
	*Methylene Yellow H (100%)—(M)				
	*Basic Yellow TCN (standard 100%)—(C) (Thioflavine TCN)				
624	Violet Modern N	220	.....	Switzerland	100
	*Modern Violet N Powder—(DH)				
627	Anthracyanine	110	.....	Switzerland	100
	Modern Cyanine V Powder—(DH)				
633	Indalizarin R	330	.....	Switzerland	100
	*Indalizarin J Paste—(DH)				
658	Fast Black	46	.....	Germany	100
	*Gallophenine P—(By)				
661	Thionine Blue	500	.....	Germany	100
	*Thionine Blue—(M)				
663	New Methylene Blue	1,100	1,853	Germany	91
	*New Methylene Blue NX (100%)—(C)			Canada	9
	*Methylene Blue NNX (70%)—(B)				
672	Azo Carmine	100	.....	Canada	100
	*Azo Carmine GX (standard strength)—(B)				
673	Azo Carmine B	375	465	Italy	88
	Azo Carmine BHX—(B)			Canada	12
	*Azo Carmine BX (standard strength)—(B)				
	*Rosinduline 2B Bluish (100%)—(K)				
705	Indamine 6R	500	.....	Germany	100
	*Acid Cyanine BF—(A)				
747	Thional Red Brown	220	.....	Switzerland	100
	*Thional Brown G—(S)				
759	Anthraflavone (single strength)	2,528	2,025	Italy	100
	*Anthraflavone GC Paste Fine—(B)				
	*Anthraflavone GC Paste—(B)				
	*Anthraflavone GC Powder—(B)				
760	Indanthrene Golden Orange G (single strength)	4,202	3,551	Italy	85
	Indanthrene Golden Orange G Paste—(B)			France	15
	*Indanthrene Golden Orange G Dbl. Pst.—(B)				
	*Indan. Golden Orange G Dbl. Pst. Fine—(B)				
	*Indanthrene Golden Orange G Powder—(B)				
761	Indanthrene Golden Orange (single strength)	6,177	7,251	Italy	62
	*Indanthrene Golden Orange 2RT Pst.—(B)			Germany	17
	*Indanthrene Golden Orange 2RT Pdr.—(B)			Canada	13
	*Indanthrene Golden Orange RRTS Pdr.—(B)			France	8
	*Helindone Golden Orange IRRT Paste Fine (10%)—(M)				
767	Indanthrene Violet RR (single strength)	2,699	2,587	Germany	52
	†Helindone Violet IRR Ex. Pst. (10%)—(M)			Italy	48
	†Indanthrene Violet RR Ex. Dbl. Pst.—(B)				
790	Acid Alizarine Blue BBGR	224	233	Germany	88
	*Anthracene Blue SWB Powder—(B)			Canada	22
	*Anthracene Blue SWGG Extra—(B)				
	*Anthracene Blue SWR Powder—(B)				
794	Cibanone Black (single strength)	1,760	.....	Switzerland	100
	*Cibanone Black 2G Powder (100%)—(S)				
795	Cibanone Yellow R	6,393	.....	Switzerland	100
	*Cibanone Yellow R Paste (10%)—(S)				

Schultz No.	Name of Dye and Manufacturer	Quantity Pounds	Value Dollars	Per Cent by Countries	
799	Alizarine Cyanine G	882	.....	Germany	100
	*Alizarine Cyanine 2G Powder—(By)				
820	Algol Brilliant Violet R (single strength)	3,115	1,716	Italy	100
	*Algol Brilliant Violet R Paste—(By)				
	*Algol Brilliant Violet R Powder—(By)				
828	Indanthrene Claret B	825	.....	Italy	100
	*Indanthrene Bordeaux B Ex. Pst.—(B)				
831	Indanthrene Red BN	419	.....		
	*Indanthrene Red BN Extra Paste—(B)				
838	Indanthrene Blue RS (single strength)	8,097	.....	France	100
	Indan. Blue RS Triple Pdr. for paper—(B)				
840	Indanthrene Blue 3G (single strength)	493	401	Italy	100
	Indanthrene Blue 3G Paste—(B)				
	†Indanthrene Blue 3G Double Paste—(B)				
842	Indanthrene Blue GCD (single strength)	4,863	2,491	Canada	59
	Indanthrene Blue GCD Paste—(B)			Italy	41
	†Indanthrene Blue GCD Double Paste—(B)				
	†Indanthrene Blue GCD Powder—(By)				
849	Indanthrene Yellow G (single strength)	220	.....	Italy	100
	†Indanthrene Yellow G Double Paste—(B)				
850	Indanthrene Blue WB	49	.....	Canada	100
	*Indanthrene Blue WB Powder—(By)				
853	Anthraquinone Violet Powder	20	.....	Canada	100
	*Anthraquinone Violet (standard strength)—(B)				
855	Alizarine Pure Blue	160	.....	Italy	70
	*Alizarine Sky Blue B Powder—(By)			Germany	30
856	Alizarine Astrol	5,101	11,052	England	51
	*Alizarine Astrol B Powder—(By)			Italy	43
	*Alizarine Rubinol GW—(By)			France	6
	*Alizarine Rubinol GW Powder—(By)				
	*Alizarine Rubinol R—(By)				
	*Alizarine Rubinol R Powder—(By)				
	*Alizarine Rubinol 3G—(By)				
858	Alizarine Saphirol B	1,336	2,254	Germany	41
	Alizarine Blue SAWSA Powder—(By)			Italy	41
	†Alizarine Saphirol—(By)			France	18
	†Alizarine Saphirol B—(By)				
	†Alizarine Saphirol B (100%)—(By)				
	†Alizarine Saphirol WSA—(By)				
	†Helio Fast Blue BL (100%)—(By)				
859	Cyananthrol R	220	.....	Italy	100
	*Cyananthrol RXO—(B)				
860	Cyananthrol G	275	.....	Italy	100
	*Cyananthrol BGAOO—(B)				
862	Alizarine Blue Black B	4,729	4,023	Germany	62
	†Alizarine Blue Black B—(By)			France	14
	†Alizarine Blue Black B (100%)—(By)			Italy	14
	†Alizarine Blue Black B Powder (80%)—(By)				
863	Anthraquinone Blue Green	19	.....	Canada	100
	†Anthraquinone Blue Green BXO—(B)				
863	Anthraquinone Green GXNO	19	.....	Canada	100
	*Anthraquinone Green GXNO (66 2/3%)—(B)				
865	Alizarine Direct Green G	55	.....	Italy	100
	†Alizarine Cyanine Green G Ex. (100%)—(By)				

Schultz No.	Name of Dye and Manufacturer	Quantity Pounds	Value Dollars	Per Cent by Countries	
869	Algol Brown B (single strength)	4,492	4,171	Germany	78
	*Algol Brown G Paste—(By)			Italy	22
	*Algol Brown R Paste—(By)				
	*Algol Brown R Powder—(By)				
	* Vat Brown R Paste—(By)				
	(Indanthrene Brown R Paste)				
873	Helindone Brown	210	375	Germany	52
	*Helindone Brown AN Paste (10%)—(M)			Canada	48
	*Indanthrene Red Violet RRN Paste—(B)				
901	Ciba Violet B (single strength)	4,845	.....	Switzerland	100
	* Ciba Violet B Paste (10%)—(I)				
	*Ciba Violet B Powder—(I)				
904	Helindone Brown G (single strength)	980	.....	Italy	100
	*Thio Indigo Brown G Powder—(K)				
907	Ciba Scarlet	3,987	3,874	Switzerland	75
	*Ciba Scarlet G Extra Paste (20%)—(I)			Germany	25
	*Helindone Fast Scarlet C Paste (17%)—(M)				
910	Helindone Pink	5,043	.....	Italy	59
	*Helindone Pink AN 10% Paste—(M)			Germany	41
913	Helindone Orange R (single strength)	3,400	2,222	Germany	67
	*Helindone Orange R Powder—(M)			Italy	33
	*Helindone Orange R Powder (100%)				
915	Helindone Fast Scarlet R	440	.....	Italy	100
	*Helindone Fast Scarlet R Paste—(M)				
918	Helindone Red 3B	2,000	.....	Germany	100
	*Helindone Red 3B Paste (20%)—(M)				
919	Ciba Bordeaux B	551	.....	Switzerland	100
	*Ciba Bordeaux B Paste (10%)—(I)				
920	Helindone Violet (single strength)	440	.....	Italy	100
	Helindone Violet R Powder—(M)				
923	Ursol	385	586	Germany	100
	*Fur Brown PR—(A)				
	*Fur Brown SO—(A)				
	*Fur Brown 2R—(A)				
	†Fur Dye DG—(A)				
	*Fur Dye N†D—(A)				
	*Fur Dye SKG—(A)				
	†Fur Dye 2G—(A)				
	*Fur Dye 4G—(A)				
	*Fur Dye 113319—(A)				
	*Fur Dye 113402—(A)				
	*Fur Gray AL—(A)				

UNIDENTIFIED ACID DYES

Name of Dye and Manufacturer	Quantity Pounds	Value Dollars	Per Cent by Countries	
Acid Alizarine Gray G	1,785	3,012	Germany	56
*Acid Alizarine Gray G—(M)			Italy	24
*Acid Alizarine Gray G (80%)—(M)			France	12
*Acid Alizarine Gray G (100%)—(M)			Canada	8
*Acid Milling Yellow G Conc.—(S)	100	.....	Switzerland	100
*Alizarine Emeraldole G Powder—(By)	126	.....	Germany	100
†Alizarine Light Blue B Conc.—(S)	2,286	.....	Switzerland	100
*Alizarine Uranole 2B Powder—(By)	330	.....	Italy	100
†Azo Wool Violet 7R (standard 100%)—(C)	500	.....	Germany	100
*Brilliant Silk Blue 10B Powder—(A)	1	.....	Germany	100
Erio Fast Cyanine S—(G)	220	.....	Switzerland	100

UNIDENTIFIED ACID DYES—(Continued)

Name of Dye and Manufacturer	Quantity Pounds	Value Dollars	Per Cent by Countries	
†Erythrosine TB Powder—(DH)	55	.....	Switzerland	100
*Polar Orange R Conc. 599—(G)	999	.....	Switzerland	100
†Scarlet 2R (standard, not concentrated)—(S)	500	.....	Switzerland	100
*Yellow 5G Conc. (Sulphon Yellow 5G Conc.)—(By)	11	.....	Germany	100
*Wool Fast Blue BL—(By)	441	.....	Germany	100
*Wool Fast Yellow 3G (80%)—(B)	560	.....	Germany	100
*Wool Red G (standard strength)—(B)	50	.....	Canada	100

UNIDENTIFIED VAT DYES

Name of Dye and Manufacturer	Quantity Pounds	Value Dollars	Per Cent by Countries	
*Ciba Pink B Paste (20%)—(I)	441	.....	Switzerland	100
Helindone Black Blue IBOA—(Q)	123	.....	Italy	100
Helindone Pink	7,366	6,907	Germany	68
*Helindone Pink B Extra Paste—(M)			Italy	32
*Helindone Pink B Extra Paste (10%)—(M)				
*Helindone Pink R Extra Paste—(M)				
*Helindone Pink R Extra Paste (10%)—(M)				
*Hydron Brown G Paste—(C)	254	.....	Italy	60
			Germany	40
*Hydron Green G Paste—(C)	100	.....	Germany	100
Hydron Pink	2,747	2,993	Germany	72
Hydron Pink FB Paste—(C)				
*Hydron Pink FF Paste—(C)				
Hydron Scarlet	1,213	.....	Switzerland	82
*Hydron Scarlet 2B Paste—(C)			Italy	18
*Thio Indigo Pink RN Paste—(K)	891	.....	Italy	100
Thio Indigo Violet 2R Paste—(K)	914	.....	Italy	100

UNIDENTIFIED DIRECT DYES

Name of Dye and Manufacturer	Quantity Pounds	Value Dollars	Per Cent by Countries	
*Benzo Bordeaux 6B (25%)—(By)	220	.....	Germany	100
*Benzo Chrome Brown 5G—(Q)	155	.....	England	100
*Benzo Fast Brown 3GL—(By)	11	.....	Germany	100
Benzo Fast Heliotrope	471	708	Italy	97
*Benzo Fast Heliotrope BL—(By)			Germany	3
*Benzo Fast Heliotrope 4BL—(By)				
(Brilliant Benzo Fast Violet 4BL)				
*Benzo Fast Orange 2RL (80%)—(By)	386	.....	Germany	100
Benzo Fast Scarlet	22	33	Germany	100
Benzo Fast Scarlet 2GL—(By)				
Benzo Fast Scarlet 5BL—(By)				
*Benzo Light Brown 3GL—(By)	110	.....	Italy	100
*Benzo Rhoduline Red 3B (30%)—(By)	49	.....	Italy	100
Brilliant Benzo Fast Yellow GL—(By)	11	.....	Germany	100
*Brilliant Fast Blue B—(By)	11	.....	Germany	100
*Brilliant Sky Blue 8G Extra—(By)	330	.....	Italy	100
†Chicago Red 111—(G)	551	.....	Switzerland	100
Chlorantine Brown Y—(I)	2,205	.....	Switzerland	100
†Chlorantine Fast Yellow 4GL—(I)	1,102	.....	Switzerland	100
*Chromopurpurine JJ Powder—(DH)	220	.....	Switzerland	100
Diamine Catechine	3,186	3,194	Switzerland	97
†Diamine Catechine B (100%)—(C)			Germany	3
†Diamine Catechine GR (200%)—(I)				

UNIDENTIFIED DIRECT DYES—(Continued)

Name of Dye and Manufacturer	Quantity Pounds	Value Dollars	Per Cent by Countries	
Diamine Fast Bordeaux 6BS—(C)	176	.....	Italy	100
*Diamine Fast Brown R—(Q)	220	.....	Italy	100
*Diamine Fast Gray BN—(C)	13	.....	Germany	100
Diamine Fast Orange	1,781	1,615	Italy	68
*Diamine Fast Orange—(C)			Germany	32
*Diamine Fast Orange EG—(C)				
*Diamine Fast Orange ER—(C)				
*Diamine Fast Violet FFBN—(C)	12	.....	Germany	100
*Sky Blue N (Diaminogene Sky Blue N)—(C)	500	.....	Germany	100
*Diazamine Blue BR Conc. 6-10—(S)	10,009	.....	Switzerland	100
*Diazanil Pink B (100%)—(M)	250	.....	Germany	100
*Diazo Blue NA—(L)	2,205	.....	Germany	100
*Diazo Brilliant Scarlet B Extra—(By)	76	.....	Germany	100
*Diazo Brown 3RB Scarlet—(By)	11	.....	Germany	100
*Diazo Fast Bordeaux BL—(By)	441	.....	Germany	100
*Diazo Fast Yellow 2G—(By)	11	.....	Germany	100
*Diazo Sky Blue B—(By)	1,008	.....	Germany	100
*Diazo Violet R—(By)	137	.....	Germany	100
Naphthylamine Black 6B—(By)	500	.....	Germany	100
Oxamine Fast Blue	2,692	2,641	Germany	93
*Oxamine Fast Blue RR—(B)			Canada	7
*Oxamine Fast Blue 6B—(B)				
*Minazo Fast Blue RRX (50%)—(B) (Oxamine Fast Blue RRX)				
Parasulphon Brown	1,000	636	Switzerland	100
*Parasulphon Brown G—(S)				
*Parasulphon Brown V—(S)				
†Solamine Blue FF—(A)	500	.....	Germany	100
*Toluylene Fast Brown 2R—(By)	11	.....	Germany	100

UNIDENTIFIED SULPHUR DYES

Name of Dye and Manufacturer	Quantity Pounds	Value Dollars	Per Cent by Countries	
Pyrogene Cutch Brown 2R Extra—(I)	320	.....	Switzerland	100
Sulphur Brilliant Blue CLB—(B)	100	.....	Germany	100
Thional Yellow 2G—(S)	2,002	.....	Switzerland	100

UNIDENTIFIED BASIC DYES

Name of Dye and Manufacturer	Quantity Pounds	Value Dollars	Per Cent by Countries	
*Brilliant Cresyl Blue 2BS Conc.—(L)	110	.....	Germany	100
Methyl Violet	280	343	Switzerland	100
†Methyl Violet Crystals—(S)				
Methyl Violet 3OOXE—(P)				
Rhodamine	1,652	7,043	Switzerland	100
*Rhodamine 4GD—(I)				
*Rhodamine 6GH Conc. (425%)—(I)				
*Rhodamine 6GH (400%)—(I)				
Rhoduline Blue 3GO (Blue 3GO)—(By)	33	.....	Germany	100
*Rhoduline Sky Blue 3G (Sky Blue 3G)—(By)	33	.....	Germany	100

UNIDENTIFIED, UNCLASSIFIED DYES

Name of Dye and Manufacturer	Quantity Pounds	Value Dollars	Per Cent by Countries	
*Corvoline BT Conc. (65%)—(Q)	100	.....	Canada	100
Ink Blue BITBNOO—(Q)	444	.....	Italy	100
*Neolan Red R (115%)—(S)	110	.....	Switzerland	100

UNIDENTIFIED MORDANT AND ACID CHROME DYES

Name of Dye and Manufacturer	Quantity Pounds	Value Dollars	Per Cent by Countries	
†Anthracene Chromate Brown EB—(C)	1,500	.....	Germany	100
*Chromazurine G Powder—(DH)	110	.....	Switzerland	100
*Chrome Fast Green B—(S)	220	.....	Switzerland	100
Chrome Violet CG Powder—(DH)	110	.....	Switzerland	100
Chromorhodine	991	3,335	Switzerland	100
Chromorhodine BN Powder—(DH)				
Chromorhodine BR Powder—(DH)				
*Chromorhodine 6GN Extra Powder—(DH)				
*Chromoxane Brilliant Blue G—(Q)	650	.....	Italy	100
†Eriochrome Black DF Conc. 1048—(G)	220	.....	Switzerland	100
*Eriochrome Flavine A Conc.—(G)	1,764	.....	Switzerland	100
*Eriochrome Red G—(G)	1,100	.....	Switzerland	100
*Metachrome Blue Black 2BX—(A)	4,000	.....	Germany	100
Modern Green N Powder—(DH)	110	.....	Switzerland	100
Modern Olive JN Powder—(DH)	110	.....	Switzerland	100
Modern Royal Blue Powder—(DH)	661	.....	Switzerland	100
Omega Chrome Brown	1,190	1,145	Switzerland	100
Omega Chrome Brown G Conc.—(S)				
Omega Chrome Brown PB Conc.—(S)				

BLEACHING SILK

(*Concluded from page* 384.)

than too much. Then the sodium peroxide is put in. If there is too little acid, more may now be added, a small amount at a time, until the blue litmus paper reacts with a red spot upon being wetted with a few drops of the liquor. In carrying out these directions care should be exercised that the additions are well stirred into the body of the bath.

If we should begin with too much acid we should then have to add sodium peroxide (or some other alkali or alkali producer) to get the acidity to a known small excess. It is perhaps better to calculate the right amount of acid in the first place, and then to put in less than the whole. Upon adding further and small amounts the litmus paper will tell us when to stop.

To calculate the amount of acid we may proceed thus: The molecular weight of Na_2O_2 is 78, the atomic weight of sodium being 23 and of oxygen 16; the molecular weight of H_2SO_4 is 98, the atomic weight of hydrogen being 1, that of sulphur 32 and that of oxygen 16.

As we wish (see second equation) to combine one molecule of Na_2O_2 and one molecule of H_2SO_4, we must have the weights of these two substances in the ratio of 78 to 98—or, what is the same thing, of 39 to 49. The following recipe will be in accord with this result: Sodium peroxide, 39 parts; commercial sulphuric acid in such amount as to provide of H_2SO_4, 49 parts. These parts are by weight. The amount of commercial sulphuric acid will, naturally, depend upon the particular degree of concentration employed.

I give a working recipe from an American authority:

100 gallons water
5 pounds 5 ounces sulphuric acid, 168 deg. Tw.
4 pounds sodium peroxide, 98 per cent.

The amount of sulphuric acid is slightly in excess of the exact amount.—Silk.

Vance Knitting Company, Kernersvlle, N. C., are enlarging their plant. The new building is approximately 50x100 feet, two stories, and will give an ultimate capacity of 500 dozen hose per day of ten hours. A new boiler house and dye plant will be added. J. E. Sirrine & Co. are the engineers.

Certain American brands of cotton hosiery and underwear are increasing in popularity in India in spite of Japanese competition in the lower grades. American silk hose are especially liked because of their superior appearance and wearing qualities. Statistics for the eight months from April 1 to December 31 show the value of cotton hosiery and underwear imports by principal countries to have been: Japan, 4,709,898 rupees; United Kingdom, 232,945 rupees; United States, 137,564 rupees; others, 799,862 rupees.

The Progressive Color & Chemical Company, New York, has been incorporated with a capital of $100,000. The incorporators are G. A. Kuhl, H. Hintze and H. Felix. The company is represented by O. Oechler, 481 Knickerbocker Avenue, Brooklyn, N. Y.

AMERICAN
DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

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THE GOVERNMENT SCORES

AS a result of long and sometimes bitter experience, there is an unobtrusive but very definite and persistent impression in the minds of many that publication of statistical matter by the United States Government is usually a tedious affair, running into months before the desired data are available in final form. This much is probably true: that even making due allowance for the necessary insistence upon accuracy and verification, and the difficulty of collecting facts from scattered and unresponsive sources, the time taken is frequently too long by far; and so the various trades have been content to depend principally upon the less authoritative but speedier service offered by the press, and to file away the Government matter, when it came along, for future information.

Much of this impression has already been dispelled, we imagine, by the truly remarkable performance of the Chemical Division of the Bureau of Foreign and Domestic Commerce, acting in conjunction with the Chemical Division of the U. S. Tariff Commission, in placing in the mail on May 3 the complete report of foreign dyes imported through the Port of New York during April. This report, which arrived just too late for inclusion in THE REPORTER of May 7, will be found elsewhere in the present issue; but let it be said that never, since the reports were inaugurated, has it come so near to "making" the first of our two or three monthly numbers. Such service is not only all that could possibly be asked, but better, even, than one has a right to expect as a regular thing.

When one stops to consider the magnitude of the report, and the endless detail of classification and identification of manufacturers, sources and percentages, this achievement becomes all the more remarkable and worthy of commendation—so much so, in fact, that the Dyestuff Section of the Synthetic Organic Chemical Manufacturers Association, at its last monthly meeting, passed a resolution of appreciation to be forwarded to the chiefs of the departments concerned.

This achievement is a real landmark of progress, for it is the first time on record that the Government has been able to supply the public within three days with information on tariff figures of the entire preceding month, and it should indicate plainly that despite the croakings of pessimists, two Government bureaus can work together in hearty co-operation, and that the result of that co-operation can be an accomplishment which will still forever the cries that supervision of dye imports is so cumbersome as to impede the operations of importers and consumers.

To the appreciation of the S. O. C. M. A. The REPORTER wishes to add its own. As long as the present tariff regulations last, and as long as such service is rendered, the two Government bureaus involved are entitled to the unstinted applause and aid of the industry.

"FROM THE LOWELL COURIER CITIZEN"

WHILE none of the following may be considered in the light of news to REPORTER readers, it is nevertheless interesting and well worth perusing as a striking example of the sanity and accuracy which characterize much of to-day's press comment on matters relating to the color making and using trades. Contrasted with some of the former efforts with which we are all familiar, it is a model. Considered on its own merits, it commands the attention of the trades involved for its soundness of view, its clarity and its compactness. We insert it here for the express purpose of suggesting that you send a clipping of it to your local paper:

The first attempt to manufacture coal tar dyes in this country was made as early as 1868, and during the next ten years developments along this line were of such a nature that it looked as though the manufacture of coal tar colors might become one of the prominent industries of the country. However, owing largely to an unsatisfactory protective tariff and keen and oftentimes unscrupulous foreign competition, the industry from that time on had a very uncertain, and for the most part, unsatisfactory career.

At the outbreak of the war in 1914, several concerns were manufacturing dyes in this country, but these dyes were for the most part made from so-called intermediates which were in turn manufactured in Germany. The supply of these was soon cut off and the American dyestuff industry was placed in a position far worse than it had been for twenty years previous. In spite of this fact, American chemists and dyestuff manufacturers with almost unprecedented activity turned their attention to the development of the industry upon a purely American foundation, and in the last few years have developed it to a point where to-day there are but few of the important dyes that are not satisfactorily made here and, with the exception of a few special colors, the American

textile industry is at the present self-contained as far as dyestuffs are concerned and would be able to run almost indefinitely without importations from abroad.

At first the quality of some of the American made dyes was not all that might have been desired, but as time went on the processes of manufacture were improved and to-day most of the dyes made in this country are of a quality equal in every respect to imported German dyes and in a number of instances American textile manufacturers have pronounced some of these dyes to be much better than the same product obtained from abroad before the World War.

Few people realize that even at the present time there is an organized attempt to discredit the achievements of the American dyestuff industry, and in a more or less insidious way it has extended to various branches of our Government. The attempt to disrupt the whole plan of the "Chemical Foundation," an organization authorized by the Government during the war for handling German dye and chemical patents, is still pending before the courts, and is a typical illustration of the activities along these lines which are apparently being led by foreign interests and importers of foreign dyes. It is believed, however, that the recent investigation on the part of one of the Senate Committees has, to a considerable degree, enlightened Congress in regard to the absolute falsity of the many charges which were made concerning the Chemical Foundation and American dyestuffs manufacturers.

Owing largely to this propaganda, which was most active when the section of the tariff on dyes was being considered in Congress, the measure was greatly modified to the disadvantage of the dyestuffs manufacturers. The invasion of the Ruhr Valley by the French, however, has had some tendency to counteract the unfavorable features of the tariff, because the German dye industry is largely dependent on raw materials and intermediates which are manufactured in this district. The unsettled industrial situation in Germany has also had a tendency to interfere with the manufacture as well as to temporarily curtail the exportation of dyes from Germany.

The American Association of Textile Chemists and Colorists has recently become quite an important factor in the color industry of the United States. As an organization it stands more or less between the user of dyes on the one hand and the manufacturer on the other. In less than two years this organization has grown to a membership of over 500 with well organized local sections in Boston, Providence, New York and Philadelphia. When we consider that to become a member of this national association one must have had at least five years of actual experience along the lines of textile chemistry and the application of dyes, and must at the time of election be actively engaged in the coloring industry, the standing and influence of this organization will be understood. This association is at the present time conducting well organized investigations and research work in regard to fastness of dyes and methods of testing, and there will soon be presented for official acceptance a series of standards and tests which will be more scientific and complete than any which have heretofore been formulated.

When the general public buys dyed textile material of any kind, and finds it to be unsatisfactory as far as the fastness of the colors is concerned, the trouble may be assigned to one of three reasons:

1. The demand on the part of the public for colored goods the production of which with the fastest dyes would make them so costly as to be unaccepted by a large proportion of the prospective buyers.

2. The improper choice of dyes on the part of the manufacturer; in other words, using dyes for certain purposes for which they were never intended and for which some better dye could have readily been substituted.

3. The lack of proper dyestuffs or a poor quality of the dyes on hand. Of these causes, the first two are the foremost while the last is almost negligible at the present time. In this connection it might also be interesting to note that some of the unsatisfactory results in dyeing often attributed to American dyes, when followed up, were found to have been produced with German dyes. The American people can do much to help the American color industry by withholding criticism until they are actually certain that it is justified. Criticisms which might have been justified five or six years ago are almost entirely without foundation at present. The store clerk who to-day says, "We cannot stand behind these colors because they are American made," is misleading the public either through ignorance or intention. As far as the American dyestuffs manufacturer is concerned there is no reason why dyed materials should not be as fast to-day as they were before the war.

As a result of exhaustive research, and untiring efforts on the part of American chemists, the domestic dyestuffs industry has reached a point in development where it is not only able to provide from 80 to 90 per cent of our own requirements but also has considerable surplus production for exportation. In fact, the future success of this industry depends as much upon its ability to create a foreign market as it does upon the control of home consumption.

The very close competition which existed before the war had so reduced the American dye industry that it had ceased to be a factor in the market. The sudden curtailment of the German trade made it necessary for America to turn to other sources. England and Switzerland were the only possibilities. England soon put an embargo on the exportation of dyes, and the Swiss output was wholly inadequate. There was but one thing to do, namely, to develop the home industry, and this short article has indicated how satisfactorily this has been accomplished.

The Lowell Textile School has greatly aided in this enterprise. Not only was it able to carry out numerous

experiments in its chemistry and dyeing department, but to a greater extent by turning out a large number of valuable workers in this field. Among its graduates are numbered some of the foremost dyestuff chemists and colorists in this country.—From the Lowell Courier Citizen.

LEO R. WEBBER

Leo R. Webber, associated for many years with the dyestuff department of A. Klipstein & Co., died suddenly at his home, 167 East Fourth Street, Brooklyn, N. Y., on Tuesday, May 8. Mr. Webber was at his desk on the Saturday previous to his demise, and fell a victim of an acute attack of pneumonia.

Mr. Webber was exceptionally well and favorably known to members of the dyestuff fraternity. He had been connected with A. Klipstein & Co. for sixteen years, and during the last several years had acted as personal assistant to E. C. Klipstein in the management of the firm's dyestuff business. He was a man universally popular and will be greatly mourned by a wide circle of friends. He was thirty-seven years old, and is survived by his widow and one child.

NEWPORT ANNOUNCES DIRECT PURE YELLOW M

Newport Chemical Works, Inc., has announced the addition of Newport Direct Pure Yellow M to their line of direct colors. This product is identical with those listed under Schultz number 198, of which probably the best known qualities were Naphtamine Pure Yellow G, Clayton Yellow and Mimosa, well liked, it will be remembered, for the brilliant clear tone produced and the virtue of leveling easily—for which reason it found extensive use as a shading color, particularly for greens.

Recent Patents

Process of Preparing Coumarin

U. S. 1,437,344. Chauncey C. Loomis, New York, N. Y., assignor to Semet-Solvay Company, Solvay, N. Y.

This sets forth the improvement in the process of preparing coumarin which consists in mixing the reaction mixture obtained by heating together salicylic alhedyde, sodium acetate and acetic anhydride with milk of lime and heating the mixture, filtering the mixture and treating the filtrate with acid and finally separating out the coumarin.

Process of Dyeing Cellulose Acetate or Products Made Therewith

U. S. 1,448,432. Rene Clavel, Basel, Switzerland.

Describes a process for dyeing acetyl cellulose in artificial silk, film or other form, comprising the application for the direct dyeing of the acetyl cellulose in an aqueous medium, of a dyestuff having in its chemical constitution an active group content preponderant numerically over any sulpho group content of the dyestuff, the dyestuff in no case containing more than one sulpho group.

Production of Naphthylamines

U. S. 1,449,423. Alexander Lowy and Arthur Mark Howald, Pittsburgh, Pa.

Claim is granted for the described process, which comprises subjecting the vapors of beta-naphthol to the action of the ammonia containing gases in the presence of aluminum oxide as a catalyzer at a temperature between 300 and 550 deg. Cent.

Method of Indigo Dyeing

U. S. 1,449,981. Edward T. Garsed, Charlotte, N. C., assignor to Alexander & Garsed, Inc., Charlotte, N. C.

Describes the method of dyeing yarn which consists in winding the yarn on a beam, forcing dye liquor through the yarn while on the beam, rebeaming the yarn, and in oxidizing the dye while rebeaming.

Process for Manufacturing Synthetic Colored Leather

U. S. 1,436,107. Hubert W. Morgan, Lakewood, Ohio.

Describes a process for manufacturing a colored leather-like material in which the color permeates the entire mass of the material, consisting in first softening a mass of fibers in an alkaline solution and next immersing them in acetic acid until a predetermined proportion of the mass is converted into amorphous cellulose, the remaining fibers being held in suspension therein, thus forming a plastic dough-like mass, incorporating a binder and coloring material in a powdered form and allowing the mass to set, next mechanically treating the mass to flatten and solidify the mass and temper the same, and to produce a fine and even texture therein and finally curing the same by exposing it to a current of air in a heated room.

Process for the Manufacture of Chromed Dyestuffs

U. S. 1,440,566. Fritz Straub, Basel, Switzerland, assignor to Society of Chemical Industry in Basle, Basel, Switzerland.

Claim is granted for the process for the manufacture of chromium compounds of azo dyestuffs containing groups capable of being chromed, which consists in reacting with polyvalent alcohols on alkaline suspensions of chromium hydroxide, introducing the azo dyestuffs into the solution thus prepared and heating the whole mass until the dyestuff chroming is achieved.

Process for Dyeing Cellulose Acetate

U. S. 1,440,501. Edouard Paul Sisley, Lyon, France, assignor to Societe Chimique des Usines du Rhone, Paris, France.

This is a process for preparing cellulose acetate for dyeing which consists in treating cellulose acetate articles with a solution of sodium phosphate.

INQUIRY DEPARTMENT

All classes of chemical work or advice relating to artificial colors, natural dyestuffs, dyewoods, raw materials, extracts, intermediates, crudes, or dyeing chemicals and accessories in general, will be carried out for readers and subscribers of the AMERICAN DYESTUFF REPORTER by this department.

Inquiries of a minor character will be answered on this page, while major matters involving personal investigation, analyses, perfected processes and working formulas, will, if desired, be treated confidentially through the mails. In answering inquiries which, by their nature, require reference to the products, processes or apparatus of some particular manufacturer we aim to be absolutely impartial. We refer the inquiries to specialists whom we believe to be best qualified to answer them intelligently, and must disclaim responsibility if their reports show unintentional bias. All questions, materials for analysis or letters leading to the opening of negotiations for special work will receive prompt attention if addressed to Inquiry Department, American Dyestuff Reporter, Woolworth Building, New York City.

S. H. M.—*Question:* We are having some difficulty in our bleaching and would like your advice on same. We are unable to boil out of the gore of our stockings the oily black stain that appears after knitting. The oil is of a black, oily, graphity sort, and appears after the hose have been knit. A sample stocking, showing the characteristic stain, is enclosed herewith.

We use a non-fluid stainless oil in oiling our cylinder heads on our knitting machines. We give the goods an eight-hour boil in strong solution of caustic and soda ash. This does not take out the oil stains. We then bleach them in chlorine gas for an hour, but still this does not take out the stains.

We would like to know how we could remove these oil stains or if this can be done, or else whether there is any oil, either a mineral or vegetable, that can be used on the cylinders and sinkers of a knitting machine that is a stainless oil and at the same time will perfectly lubricate the parts of the machine to which it is applied.

We have tried many stainless oils, but none of them gives us the desired results. Anything you can do to help us in this we will appreciate.

Answer: We have succeeded in completely removing the stains which showed on the sample stocking which you sent us. This was accomplished by a treatment with ether, which removed the yellowish oil stains but not the dark colored line. A subsequent washing with soap and warm water, however, removed the latter.

We believe that this trouble can be minimized through a judicious combination of the following directions and treatments:

In the first place, use as nearly a stainless oil as possible, and then use as little of the oil as is necessary to give the proper lubrication. It is frequently the case that much more oil is used for this purpose than is necessary. In the third place, keep the cylinder head cleaner—i. e., clean it much more frequently than you probably have done in the past. Finally, in order to remove this stain in case it appears, give the hose a treatment in a short or concentrated bath containing soap and some organic solvent, and succeed this treatment with a regular scour. An oil made from one of the so-called light colored mineral oils, with the addition of about 20 per cent of a good quality of lard oil, makes an excellent lubricant for this purpose and can, as a rule, be easily removed.

D. J. G.—*Question:* I should like to know if you could tell me the best methods of dyeing wool yarn in a carpet factory previous to its being made into rugs. Possibly you could suggest some books or magazines on this subject. I have had enough chemistry to understand a somewhat scientific report. Possibly you could tell me also if the typical dyehouse of a carpet company is injurious to the workers on account of the fumes. I am working in one at the present time, but as yet have been unable to find out the chemicals used and the chemistry of both the washing and the dyeing. I should also like to know a better way of removing steam than we have in operation now.

Answer: In reply to your general questions regarding dyeing carpet yarn, we suggest that you read the article, entitled "Carpet Yarn Dyeing," written by Dr. Louis J. Matos, of the National Aniline & Chemical Company, which begins on page 369 of the May 7 issue of the AMERICAN DYESTUFF REPORTER.

As to textbooks, we suggest Hummell's "Dyeing of Textile Fabrics," an old work but rich in much that doesn't appear in many of the newer books. Also "Color Matching on Textiles" and "The Color Printing of Carpet Yarns," both by David Paterson. We presume you are acquainted with the "Manual of Dyeing," by Knecht, Rawson and Lowenthal. You might also request from various dyestuff manufacturers copies of their several shade cards best adapted for carpet yarn work.

By removing steam from the dyehouse we presume you mean "fog," which is a ventilating and heating problem. Its prevention by heating the air of the dyehouse is often more satisfactory than to attempt its removal by fans or blowers alone. This is a problem which should be taken up with an engineering concern which makes a specialty of apparatus for this purpose.

As to the healthfulness of dyehouses, this is largely a matter of the personal habits of those who work in them. Other things being equal, sufficient ventilation is essential and dry floors are desirable. If the floors are wet, care should be taken to keep the feet dry by means of wooden-soled clogs and to change to dry clothing when the day's work is finished.

It is doubtful if the characteristic odors of the dye-

house, commonly termed "fumes," are on the whole more injurious than the odors common to most industrial occupations. Of course, actually inhaling strong fumes from the nitrite bath of the diazotizing process would be injurious, but a good dyer will not permit such fumes to leave the bath; he wants them to do chemical work on his yarns.

Foreign Trade Opportunities

Reserved information may be obtained from the U. S. Bureau of Foreign and Domestic Commerce and its district and co-operative offices by duly registered firms and individuals upon written request by opportunity number. The bureau does not furnish credit rating or assume responsibility as to the standing of foreign inquirers; the usual precautions should be taken in all cases, and where no references are offered it does not necessarily imply that satisfactory references could not be given. Correspondence may be in English unless otherwise stated. Symbols: *Reported by American consular officers; †Reported by commercial attaches and trade commissioners; ‡Direct inquiries received by the Bureau.

6235.*—Household hardware, white enamelware, tools, medium grade jewelry, alarm clocks, high-grade watches, women's medium grade silk and cotton hosiery, men's shirts, and cotton underwear—Johannesburg, South Africa. Exclusive agencies.

6239.*—Motor-car upholstery hides, dyes, furniture hides, and sheepskins for furniture—Antwerp, Belgium. Purchase and manufacturers' agency.

6243.*—Children's half and three-quarters cotton hose, plain and fancy; women's cotton, artificial silk, and silk hose, French (wide) tops; and men's cotton, artificial silk, and silk hose, and cotton fleece underwear—Cape Town, South Africa. Manufacturers' agency.

6244.*—Hosiery, knit goods, and underwear—Bordeaux, France. Agency.

6245.‡—Ply and filling yarns in gray, bleached, and colored—England. American representative desires to place orders.

6246.*—Sporting articles of all kinds, and sport hosiery—Geneva, Switzerland. Purchase.

6247.*—Footwear, silk, cotton, and woolen piece goods, bathing costumes, hosiery, etc.—Johannesburg, South Africa. Exclusive agencies.

6271.*—Jute-weaving machinery and portable timber-cutting machines—Saigon, Indo-China. Purchase.

6274.*—Rubber belts, rubber tires, low-priced hosiery, paints, hardware, automobiles, etc.—Rangoon, India. Purchase.

6324.‡—Groceries, chocolates, hosiery, silk goods, women's clothing, etc.—Johannesburg, South Africa. Agency.

6326.‡—Plain and lisle cotton, artificial silk, and pure silk hosiery, and also cotton, silk and mixture underwear — Hobart, Tasmania. Manufacturers' agency.

6333.†—Textiles and notions, upper and fancy leather, hardware, paper, and stationary supplies—Rio de Janeiro, Brazil. Agency.

6334.*—Very cheap cotton blankets, cotton shawls, beads, enameled and tin mugs, lunch cans, cotton handkerchiefs, woolen yarns, and similar goods, all of the cheap grades—Johannesburg, South Africa. Agency.

6337.*—Hardware, cotton piece goods, fancy goods, toilet requisites, autmbile accessries, coffee, flour, advertised cereal foods, groceries, canned fruits, etc.—Johannesburg, South Africa. Exclusive agencies.

6194.†—Textiles, particularly cotton goods—Santiago, Chile. Agency.

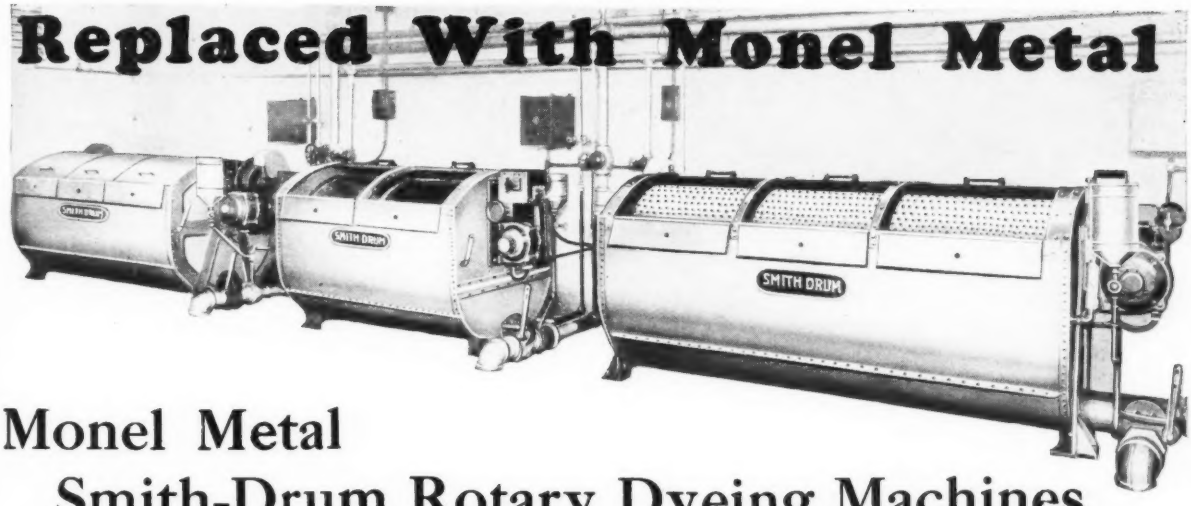
6200.*—General lines of provisions and silks and dry goods—Havana, Cuba. Agency.

6201.*—Cotton tweeds, duck, and piece goods, including khakis, drills, shirtings, coverts, denims, and also hosiery and underwear—Johannesburg, South Africa. Exclusive agencies.

6202.*—Brussels, Axminster, and velvet rugs, 7 by 9, 9 by 12, and 15 by 18 inches, 200 to 300 yearly; and runners, plain and bordered, 15,000 to 20,000 yards per year—Budapest, Hungary. Purchase and manufacturers' agency.

WANTED—Copies of the February 26, 1923, and February 12, 1923, issues of AMERICAN DYESTUFF REPORTER. Owing to extra demand, our file copies of the above issues have been exhausted. Anyone willing to part with one or more of these copies will confer a favor by addressing this office. AMERICAN DYESTUFF REPORTER, 4109 Woolworth Building, New York City.

Replaced With Monel Metal



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Things We Have Always Known

The recent business condition has brought to the forefront of thought many fundamental considerations that have always been known but have been damned with faint praise.

Human nature in the mass is very much like human nature in the individual. One of its dominant characteristics has been summed up in the observation, "You never miss the water till the well runs dry." We never appreciate fundamental things until we have occasion to do without them.

This observation has a special application to the Demand of the public for the products of industry. While the Demand was at high tide and everybody was busy trying to supply that Demand at a profit no one, seemingly, gave a thought to where the Demand came from, how long it might last, or what would happen if it should fail. We merely assumed the permanent existence of the Demand, just as we assume the presence of water, air, and fire.

But a day came when Demand began to subside, and in many industries it came almost to a full stop. And then we missed it, and realized, as never before, what an important thing it was. And we began to inquire where it came from in the first place, and how it might be restored.

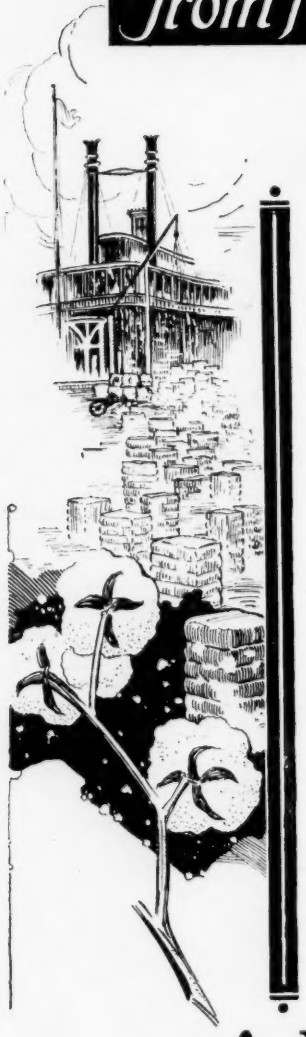
We always knew — everybody knew—that Desire for things made a Demand for them in the market. That people desired things we accepted as an elemental fact. But when we discovered that Desire fluctuated we began to appreciate that Desire, as we know it, is a thing created by the art of man. It is a highly specialized form of an elemental need—just as a Louis XVI chair is made out of a tree.

This discovery led to another equally important discovery that the means of refining and specializing that Desire was Advertising. The gigantic work that has been accomplished by modern advertising now stands out in bold relief. It has been the means by which the refinements of civilization have been made known and made desirable, and this desire has been made into Demand. It is a simple fact that a million profitable forms of industrial activity owe their very existence to the fact that Advertising upheld the standards of living which in turn provided the demand for their products.

[Published by the American Dyestuff Reporter in co-operation with The American Association of Advertising Agencies]

KLIPSTEIN

From Raw Stock to Finished Fabric



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